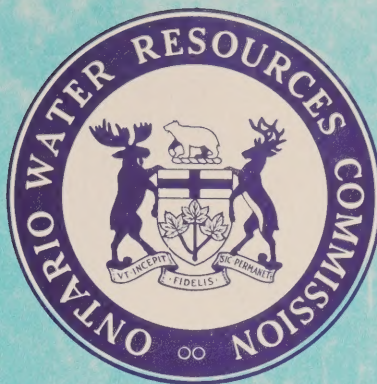



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Government
Publications



ANNUAL REPORT 1963

**ONTARIO
WATER RESOURCES
COMMISSION**



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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE CHAIRMAN

801 Bay Street
Toronto 5, March 11, 1964.

To the Honourable J. W. Spooner
Minister
Department of Municipal Affairs

Sir:

I have the honour to present the Eighth Annual Report of the Ontario Water Resources Commission, made in conformity with and under provisions of The Ontario Water Resources Commission Act.

The activities of the Commission continued at a high level throughout the year. Special emphasis was given to water resources development and management and to the Division of Research and excellent results were achieved.

Distinct improvement in the quality of water in the lakes, rivers and streams of the Province is becoming evident as the effect is felt of the increased treatment of municipal and industrial wastes. A severe drought during the year resulted in water shortage in many areas. A careful study has been made of this with the object of introducing remedial measures that will reduce the drought problems of the future.

Respectfully submitted,

A large, stylized handwritten signature in dark ink, which appears to read "Ambrider".

Chairman

**EIGHTH
ANNUAL REPORT**

1963

**Ontario Water Resources Commission
801 Bay Street
Toronto**

EIGHTH
ANNUAL REPORT



Ontario Water Resources Commission
801 Bay Street
Toronto



ONTARIO WATER RESOURCES COMMISSION

A. M. SNIDER
CHAIRMAN

W. D. CONKLIN, Q.C.
COMMISSIONER

J. H. H. ROOT, M.P.P.
COMMISSIONER

Dr. J. A. VANCE
COMMISSIONER

A. A. WISHART, Q.C., M.P.P.
COMMISSIONER



D. S. CAVERLY
GENERAL MANAGER

G. M. GALIMBERT
Asst. GENERAL MANAGER

L. E. OWERS
Asst. GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

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PREFACE

The diversified program of the Ontario Water Resources Commission continued on an active basis during 1963, highlighted by increased interest in the field of research and the water resources management program.

The composition of the Commission remained unchanged during 1963, with A.M. Snider, Waterloo, chairman, and the commissioners, W.D. Conklin, Q.C., Kingsville; John H.H. Root, M.P.P., Orton; Dr. J.A. Vance, Woodstock; and A.A. Wishart, Q.C., M.P.P., Sault Ste. Marie.

Major Staff Changes

The year was marked by a major reorganization in the Commission's top administrative staff set-up. This followed the retirement, after 40 years of service with the Ontario Government, of Dr. A.E. Berry as general manager and chief engineer. He was succeeded as general manager by D.S. Caverly, formerly an assistant general manager and director of the OWRC's Division of Plant Operations. This was followed by a definite division of responsibilities between two assistant general managers, one of whom, G.M. Galimbert, relinquished his position of director of the Division of Sanitary Engineering to devote his full time to his new duties of supervising and co-ordinating the work of the divisions of Water Resources, Sanitary Engineering and Laboratories. L.E. Owers, executive engineer, was appointed the other assistant general manager and was delegated to supervise and co-ordinate the activities of the divisions of Construction and Plant Operations, the Real Estate Branch and other project activities.

Early in the year, the Commission set up a Management Committee, consisting of three commissioners including Chairman Snider, to facilitate Commission business. The other committee members were Commissioners Root and Vance.

The vacant directorships in the divisions of Sanitary Engineering and Plant Operations were filled by the appointments of the respective former assistant directors, K.H. Sharpe and B.C. Palmer.

Increased activities in the field of research were occasioned by the appointment of a director and the provision of a staff for a Division of Research. A.J. Harris, formerly assistant director of the Division of Laboratories, was named director of the new division.

The water resources management program came to the fore when, for the first time since its inception, the water-taking permit program became a major operation. Previously much time had been

spent in educating water takers and potential water takers concerning all aspects of the program through which, in most instances, anyone wishing to take 10,000 gallons or more a day from any source whatever, first had to obtain a permit from the OWRC. During the year, 2,706 permits were issued, most of which were for purposes of irrigation, particularly to tobacco growers. During the summer, extra staff was acquired to see that permit conditions were being observed.

Certificates of Approval

In the matter of issuance of Certificates of Approval by the Division of Sanitary Engineering to municipalities or others wishing to build new water or sewage works, or make extensions to existing ones, the figures for 1963 are of interest. The obtaining of these certificates is mandatory under The Ontario Water Resources Commission Act and they are issued only after the Division of Sanitary Engineering has found plans and specifications concerning the proposed works to be satisfactory.

During 1963 the division issued, 1,686 certificates, the works involved having a potential value of \$114,923,471.57, compared to 1962's all-time record high of \$147,754,376.81. The 1963 figure was more in line with other years, \$115 million in 1959, \$111 million in 1960, and \$107 million in 1961. Helping 1962 attain its record amount, however, were approvals issued to a few of the larger municipalities which ran into the multi-million-dollar class.

As the year ended, there was no definite or direct indication that 1964 would be any different in the volume of activity in the water and sewage works construction field. However, while it was true that much of the backlog of this type of construction had been overcome since the OWRC began active operations in 1957, it was possible that a few major water pollution control projects would enter the picture during the year. It also was possible there would be increased activity in the water supply picture in certain areas in the province

Included in the 1963 certificates issued were 121 for joint OWRC-municipal projects, the proposed work having an estimated value of \$17,068,825.30. This also was off from the 1962 peak year when there were 185 certificates at \$27,436,297.97. This refers to projects--water and sewage works--handled by the Commission at the request of the municipalities concerned.

In connection with these Certificates of Approval, it is interesting to note that in 1955 the estimate was made that \$2.4 billion would be required in the ensuing 20 years to carry out required installations in the water works and wastes treatment fields in Ontario. This would average out at \$120 million a year. The total of \$803 million for the seven years up to and including 1963 averaged out at around \$115 million per year.

Construction Activities

In the construction field, the Commission's Division of Con-

struction completed 86 contracts valued at \$21,978,254.96 excluding subsidies. Of the total, 23 were for water works at \$2,884,217.72 and 63 for sewage works at \$19,094,037.24. There were 29 OWRC projects under construction as the year 1963 ended, the major one being a sewerage system including a water pollution control plant for the City of Chatham with the cost estimated at more than \$3 million.

The 1962-63 winter works subsidy program through which the federal and provincial governments encourage municipalities to undertake public works in the winter months reached an all-time high as far as joint OWRC-municipal projects were concerned. In all, 77 claims were made on behalf of 58 municipalities for an estimated subsidy of \$2,363,874.

The Commission continued to co-ordinate its project construction program to fit in with the federal assistance program for the construction of water pollution control works administered by Central Mortgage and Housing Corporation. In such cases CMHC was authorized to lend two-thirds of the cost of that part of the sewage project which qualified and to forgive 25 per cent of this loan if the work was completed within a specified time. Where OWRC projects were concerned in these instances, the Commission acted as agent for the municipality and assumed the remaining 25 per cent of the financing. During 1963 the Commission received in the vicinity of \$10 million from CMHC on behalf of municipalities with which OWRC had project agreements.

List of Projects

From its inception to the end of 1963, the Commission had participated with 186 Ontario municipalities in 283 water and sewage projects--161 of the latter and 122 water. Cost estimates in this regard at the end of 1963 totalled \$110,052,716--\$82,950,816 for sewage and \$27,101,900 for water. All totals include projects which had put into operation, those under construction and those under OWRC-municipal agreement.

Operation of Projects

The Division of Plant Operations took over 36 new projects during the year, the increase in capital investment being about \$20 million to more than \$80 million for the 191 projects in operation as 1963 ended. Operating costs of these projects for the year totalled just over \$1.8 million.

Local Advisory Committees composed of elected and appointed municipal officials continued to serve a useful function in the joint administration of the operation of numerous OWRC-municipal projects. Supervisory staff of the division attended 95 meetings of the various advisory committees.

Sanitary Engineering

A most important aspect of the work of the Commission in 1963,

concerned the activities of the Division of Sanitary Engineering. This division inspects and supervises water and waste treatment plants throughout Ontario, it concerns itself directly with the study and abatement of pollution in the province's waterways, it supervises plumbing regulations, and, as outlined previously, it evaluates plans of proposed water supply and waste treatment installations.

In a stepped-up program of stream surveys to determine whether water quality conformed with Commission objectives for surface waters, 212 such surveys were carried out during the year compared with 147 the previous year and 50 in 1961. Also, there was increased emphasis on the county survey programs which involved taking inventories of existing uses and future needs for water, and assessing the extent of available resources for domestic water supply, commercial and industrial needs and waste disposal. In this instance the Division of Sanitary Engineering undertook responsibility for correlating and expediting this program which also involved the divisions of Laboratories and Water Resources.

Early in the year, a supervisor for a newly established Plumbing Branch of the division was appointed. Active work on revisions to the provincial plumbing regulations was started in co-operation with two committees, while better inspection and control was actively promoted through zone meetings, council meetings and conferences.

An important aspect of the work of the division was the organizing and staging of courses for Ontario's water works and sewage works operators. There were four held during 1963, one for water and the others concerned with sewage works operation. Certificates were issued to those in attendance who successfully completed a course.

Field work of the division was conducted by four district branches, each under a district engineer operating from head office. Staff members of these branches co-operated at the local level with municipal councils, public utilities commissions, municipal clerks and other officials, consulting engineers and local and district health officials.

Activities in the Laboratories

Involved in all in-the-field programs of the Commission was the Division of Laboratories, with its bacteriology, chemistry, biology, industrial waste and purification processes branches. Reflecting the increase in OWRC field activities in general was the number of samples received at the laboratories and the number of determinations made from these samples. In the bacteriology, chemistry and biology laboratories, 47,094 samples were received on which there were 160,285 determinations. This compared to 45,985 samples in 1962 and 149,038 determinations in 1962. In addition the Purification Processes Branch began recording similar activity in 1963, receiving 8,503 samples upon which 21,395 tests were carried out. This would bring the 1963 totals to 55,597 samples and 181,680 determinations.

However, activity of these branches was not confined entirely to the handling of samples. For instance, the Bacteriological Branch investigated taste and odor problems in certain water filtration plants, designed a satisfactory depth sampling device, and prepared a report regarding the optimum temperature for primary isolation of coliform bacteria. The Biology Branch continued to administer the permit system for controlling the use of herbicides and other chemicals in public water, carried out an algae research study, and, for the first time, made an investigation, through a staff taste panel, of unpalatable flavors in fish.

The Chemistry Branch, in addition to routine sample analyses, carried out some special analytical projects, including anionic detergent tests on samples of surface waters and drain discharges collected by the Division of Sanitary Engineering, and on the raw and effluent samples from all OWRC-operated water pollution control plants. Data was provided on the prevalence and treatment of these materials in Ontario.

The Industrial Wastes Branch reported progress as control and treatment of industrial wastes gained momentum. The study of problems on an industry-wide basis continued in the pulp and paper, meat packing, tanning and plating fields. Close contact was maintained with companies proposing new industrial operations in Ontario.

Completion of the District of Sudbury Water Resources and Pollution Survey was followed by an extensive review of all industries in the district to permit the preparation of an additional detailed industrial waste report. A similar detailed examination was made of industries in the Sault Ste. Marie area. The branch also was most active in the heavily industrialized area of Metropolitan Toronto and Hamilton.

The Purification Processes Branch reported that about 70 per cent of its activity was in co-operation with other sections of the Commission, consulting engineers and with municipalities and concerned problems requiring the application of chemistry and chemical engineering in water and waste treatment. Investigations and tests were carried out in connection with chlorination studies and taste and odor problems at water works, the operation of diatomaceous earth filtration units, coagulation, stability of well samples, staining, scale formation, slime growths, effect of temperature on rate of aeration, automatic control of the activated sludge process and many others.

The branch was involved with the new Division of Research in the study of canning wastes treatment by oxidation lagoons at Chatham.

Research

During this new division's development, following the appointment of a director in July, the direction and responsibility for current research projects were assumed gradually. Algae control studies being carried out by the Biology Branch of the Division of

Laboratories gradually evolved into a Division of Research responsibility. The canning wastes treatment study at Chatham also became a research division responsibility before the end of the year. Another study undertaken concerned oxidation ditches.

A decision was made during 1963 to test a tertiary treatment lagoon system through the building of a pilot plant at Brampton for treatment of that municipality's sewage effluent. Construction started just before the end of the year under the direction of the Commission's Division of Construction.

A full program for 1964 has been developed which not only includes new research projects, but also a continuation of the algae, aerated lagoon and tertiary treatment studies.

Water Resources

The Ground Water and Surface Water branches of the Division of Water Resources continued their programs related to water resources management, water resources surveys, hydrologic data collection, and the licensing of drilling and boring contractors.

Water resources surveys and investigations formed a major portion of the program of the Ground Water Branch. Work completed during the year or in progress as the year ended included 18 hydrogeologic surveys undertaken for municipalities; 10 test-drilling and well-construction projects; and 28 special investigations relating to water supply and waste disposal problems. Water levels in 56 wells were being measured at the year-end. Twenty-five investigations of reported or anticipated well interference were undertaken. Sixty-seven water-taking permits were issued for the use of underground water.

Bulk of the water resources management program involving all phases of the water-taking permit program fell on the Surface Water Branch which issued 2,633 permits during the year for the use of surface water and six jointly with Ground Water Branch. As stated previously, most applications were concerned with the irrigation of tobacco crops, and reflected the attention given by the branch to the flue-cured tobacco-growing industry in 1962 and again in the year under review. For instance, during the first five months of 1963 about 2,800 farms were visited to advise irrigators of permit requirements and to assist with the completion of application forms.

The Surface Water Branch also participated in two types of water resources surveys, the revised county survey program and river basin studies, and co-operated with the Division of Sanitary Engineering and other Commission sections in production of the reports. In the river basin survey program, the branch was able to take advantage of federal financial support through ARDA, the Agricultural Rehabilitation and Development Act.

The branch sponsored installation of 10 streamflow gauging stations in co-operation with the federal government, and continued to engage in the streamflow metering program which was inaugurated in 1962.

Administrative Branches

This section consisted of the Finance, Information, Legal, Personnel and Real Estate branches.

The Finance Branch reported estimated gross capital expenditures for the 1963/64 fiscal year at \$24 million, and ordinary vote expenditures for the same period were estimated at more than \$2.7 million. Gross capital revenue for the same period was estimated at \$11.3 million. Operation of OWRC projects under the supervision of the Division of Plant Operations totalled \$1.8 million--over \$1.4 million for sewage projects and close to \$400,000 for water.

The publicizing of Commission activities through all possible media was directed by the Information Branch. A regular news release service kept newspapers, trade publications, radio and TV informed, with other efforts including distribution of literature and the handling of numerous requests for information received by mail, telephone and personal visits to the office. The branch also was responsible for exhibits, including the major annual effort at the Canadian National Exhibition, the organizing and staging of official openings of joint OWRC-municipal projects, and the placing of advertising, including tender calls concerned with construction projects.

The Legal Branch provided a general advisory service to the Commission and to its personnel, and prepared agreements and other legal documents. Amendments to the Act approved by the Ontario Legislature were prepared by the branch. Among them was one which broadened the power of the Commission to define an area for the protection of a public water supply. Another made the Public Service Superannuation Act applicable to the permanent staff of the Commission except those who were members of The Ontario Municipal Employees Retirement System. Provision was made for a grievance board and a grievance procedure for Commission employees.

The Personnel Branch reported success in its recruitment of required professional staff from new engineering graduates from universities, and that obtaining of staff for various other scientific and technical as well as administrative duties kept pace to meet the growing demand for Commission services.

The Real Estate Branch handled all items pertaining to the obtaining of property required for various construction projects. Total value of properties acquired during 1963 established a one-year record for the Commission at \$808,381.

Staff organization at the year-end:

Administration

General Manager - D.S. Caverly
Assistant General Manager - G.M. Galimbert
Assistant General Manager - L.E. Owers
Assistant to the Gen. Mgr. - L.M. Tobias
Commission Secretary - W.S. MacDonnell
Senior Solicitor - H. Landis
Information Officer - J.C. Scott
Comptroller - D.A. Joynt
Personnel Director - A.R.W. Uren
Chief Property Agent - H.H. Mitchell
Superintendent Mech. Services - Y.T. Lambert

Division of Construction

Director - Allan W. Shattuck
Asst. Director - J.C.F. Macdonald

Division of Laboratories

Director - F.A. Voegel
Asst. Director - R.H. Millest
Supervisor, Chemistry - C.E. Simpson
Supervisor, Industrial Wastes - R.H. Millest
Supervisor, Purification Processes - J.G. Duncan
Supervisor, Biology - J.H. Neil
Supervisor, Bacteriology - L.T. Vlassoff

Division of Plant Operations

Director - B.C. Palmer
Asst. Director - C.W. Perry
Regional Asst. Supervisors - A.C. Beattie
- D.A. McTavish

Division of Research

Director - A.J. Harris

Division of Sanitary Engineering

Director - K.H. Sharpe
Asst. Director - J.R. Barr
Supervisor, Field Activities - G.H. Kay
Supervisor, Stream Sanitation - W.A. Steggles
Supervisor, Sewage Works - J.R. Barr
Supervisor, Water Works - G.R. Trewin

Division of Water Resources

Director - A.K. Watt

Asst. Director - K.E. Symons

Supervisor, Ground Water - D.N. Jeffs

Supervisor, Surface Water - K.E. Symons

More detailed information concerning the activities of all divisions and branches will be found on ensuing pages. Combined they present a complete picture of the OWRC for 1963.



ONTARIO WATER

(CONSTITUTED BY SPECIAL ACT

BALANCE

AS AT

ASSETS

CAPITAL ACCOUNT

CASH IN BANK	668,790.05
RECOVERABLE ADVANCES	20,479.46
ACCOUNTS RECEIVABLE	4,717,877.44
CAPITAL ASSETS:	
COMPLETED PROJECTS OWNED BY ONTARIO WATER RESOURCES COMMISSION	51,773,525.01
CAPITAL ADVANCES FOR COMPLETED PROJECTS OWNED BY MUNICIPALITIES	13,723,725.39
CONSTRUCTION IN PROGRESS	7,907,254.10

\$78,811,651.45

RESERVE ACCOUNT

CASH IN BANK	\$ 27,228.62
ACCRUED INTEREST RECEIVABLE	9,513.17
INVESTMENTS, AT AMORTIZED VALUE (MARKET VALUE \$1,191,416.25)	1,195,393.53
AMOUNT DUE FROM CAPITAL ACCOUNT	<u>171.38</u>

\$ 1,232,306.70

DEBT RETIREMENT ACCOUNT

CASH IN BANK	\$ 29,522.11
ACCRUED INTEREST RECEIVABLE	41,713.21
INVESTMENTS, AT AMORTIZED VALUE (MARKET VALUE \$3,189,043.75)	3,206,010.17
AMOUNT DUE FROM CAPITAL ACCOUNT	<u>9,170.90</u>

\$ 3,286,416.39

\$83,330,374.54

(x)

RESOURCES COMMISSION

OF THE ONTARIO LEGISLATURE)

SHEET

DECEMBER 31, 1963

LIABILITIES

CAPITAL ACCOUNT

ACCOUNTS PAYABLE AND CONTRACT RETENTIONS		4,406,382.36
ADVANCES FROM MUNICIPALITIES AND OTHERS		
OPERATING AND INTEREST	\$ 756,221.15	
CAPITAL	<u>3,919,910.41</u>	4,676,131.56
DUE TO PROVINCE OF ONTARIO		
TREASURY DEPARTMENT ADVANCE		35,000.00
FUNDED DEBT PAYABLE TO THE PROVINCE OF ONTARIO		
1957 ADVANCES, MATURING DECEMBER 31, 1987 5.5 %	\$ 659,670.88	
1958 ADVANCES, MATURING DECEMBER 31, 1988 4.75 %	7,502,389.38	
1959 ADVANCES, MATURING DECEMBER 31, 1989 5.9 %	11,957,869.44	
1960 ADVANCES, MATURING DECEMBER 31, 1990 6.05 %	13,979,335.39	
1961 ADVANCES, MATURING DECEMBER 31, 1991 5.62 %	11,854,332.25	
1962 ADVANCES, MATURING DECEMBER 31, 1992 5.55 %	13,403,821.26	
1963 ADVANCES, MATURING DECEMBER 31, 1993 5.71 %	<u>10,327,376.65</u>	69,684,795.25
AMOUNTS DUE TO RESERVE ACCOUNT		171.38
AMOUNTS DUE TO DEBT RETIREMENT ACCOUNT		<u>9,170.90</u>
		<u>\$78,811,651.45</u>

RESERVE ACCOUNT

FUNDS FOR RENEWALS, REPLACEMENTS AND CONTINGENCIES UNDER SECTION 43 OF THE ACT	\$ 1,232,306.70
	<u>\$ 1,232,306.70</u>

DEBT RETIREMENT ACCOUNT

SINKING FUND FOR THE RECOVERY OF THE COST OF CAPITAL ASSETS AT $3\frac{1}{4}\%$ UNDER SECTION 44 OF THE ACT	\$ 3,286,416.39
	<u>\$ 3,286,416.39</u>
	<u>\$83,330,374.54</u>

Administrative Branches

Finance Branch -- D.A. Joynt -- Comptroller

Finance Branch as usual provided a good reflection of all Commission activities and mirrored this reflection in dollars and cents.

The continued growth of most Commission activities is revealed in the following statistics:

(A) Ordinary Vote Expenditures

1960/61	\$1,505,175
1961/62	\$2,043,721
1962/63	\$2,270,256
1963/64	\$2,735,000 (Est.)

(B) Gross Capital Expenditures

1960/61	\$15,129,277
1961/62	\$15,375,965
1962/63	\$24,772,603
1963/64	\$24,000,000 (Est.)

(C) Gross Capital Revenue

	<u>Winter Works Subsidies</u>	<u>Payments from Municipalities C.M.H.C. and Others</u>	<u>Total</u>
1960/61	\$ 329,445	\$ 792,091	\$ 1,121,536
1961/62	\$ 624,129	\$ 3,333,727	\$ 3,957,856
1962/63	\$1,550,892	\$10,811,383	\$12,362,275
1963/64	\$2,363,874 (Est.)	\$ 9,000,000 (Est.)	\$11,363,874 (Est.)

(D) Expenditures in the Operation of Water and Sewage Treatment Plants

1960	\$ 586,453
1961	\$1,107,939
1962	\$1,375,787
1963	\$1,829,892

(E) Revenue from Billings to Municipalities

	<u>Debt Retirement</u>	<u>Reserve for Contingencies</u>	<u>Interest</u>	<u>Operating Expenses</u>	<u>Total</u>
1960	\$ 267,706	\$112,944	\$1,024,204	\$ 643,561	\$2,048,415
1961	\$ 656,312	\$220,244	\$1,833,270	\$1,198,251	\$3,908,077
1962	\$ 960,797	\$345,137	\$2,439,253	\$1,639,612	\$5,384,799
1963	\$1,104,654	\$466,425	\$3,026,561	\$1,998,665	\$6,596,305

The construction payments continued at relatively the same volume and in the same amount as in 1962.

Loans from the Province of Ontario, through the OWRC, for the purpose of constructing water and sewage projects totalled \$69,751,468.00 at December 31. The effective rate of interest payable on this amount was 5.659 per cent or some \$3,947,535.00 per annum.

During the year, invoices were sent to municipalities with OWRC projects, in the total amount of \$6,596,305.00 as follows:

Debt Retirement	\$1,104,654
Reserve for Contingencies	\$ 466,425
Interest	\$3,026,561
Operations	\$1,998,665

In accordance with requirements of the OWRC Act, arrangements were made to invest the amounts received for debt retirement and reserve for contingencies. The interest money was used to repay in part, the liability of the OWRC for interest on funds borrowed from the province while the amount received for operations was used to pay the operating costs of each project. Of interest was the effective rate of interest on all investments of the Commission, slightly in excess of 5.5 per cent.

Continued assistance was provided to the municipalities by the staff of the Finance Branch in the installation of accounting and billing systems, the maintaining of water utility accounting records, and in recommending metered water rates and revisions in water rate structures. The branch continued its efforts to provide a high level of service to the municipalities, creditors of the Commission, and the other divisions of the Commission.

Payroll and Machine Accounts

During the year, the activity of this section increased due to new staff hired for the Commission, the number of invoices processed for payment, and the number of new projects which came into operation.

The following statistics give an indication of the increased activity:

(A) Payrolls

	<u>Number of Staff</u>		<u>Amount Paid</u>	
	<u>Jan.1,1963</u>	<u>Dec.31,1963</u>	<u>1962</u>	<u>1963</u>
Head Office	300	338	\$1,531,992	\$1,767,227
Project Operations	162	191	\$ 630,022	\$ 754,310

The number of cheques issued for Project Operations payrolls, increased from 4,626 in 1962 to 5,267 in 1963.

(B) Projects

The number of projects increased from 155 at January 1, 1963, to 191 at December 31, 1963. Monthly operating statements were produced for majority of these projects.

Contract Payments and Record Section

During the calendar year, this section processed for payment 833 contract certificates totalling \$20,548,267.00; 441 engineering certificates totalling \$1,805,239.00 and 1,090 miscellaneous invoices totalling \$1,688,350.00 for a grand total of \$24,041,856.

Tender calls made during the year amounted to 65 while during the same period, 68 contracts were awarded.

Subsidies in respect of the 1962/63 Winter Works Program reached an all-time high with 77 claims being made on behalf of 58 municipalities for an estimated subsidy of \$2,363,874.00. Also, applications for a rebate of provincial sales tax were made on behalf of 45 projects for a total of \$174,509.00.

Purchasing Section

An increase in the number of Commission water and sewage projects in operation and continued growth of Commission activities resulted in an increase of the activities of the staff of this section. The records indicated that 39% more purchase orders were issued in 1963 than in 1962.

The following statistics give some indication of the growth of the Commission and of the activities of this section:

	<u>Number of Purchase Orders Issued</u>		
	1961	1962	1963
Head Office Purchases	1,100	1,300	2,150
Project Operation Purchases	2,082	2,282	3,010
Project Construction Purchases	<u>770</u>	<u>805</u>	<u>950</u>
	<u>3,952</u>	<u>4,387</u>	<u>6,110</u>
<u>Increase</u>		<u>11%</u>	<u>39%</u>

Information Branch -- John C. Scott, Information Officer

The start of the year 1963 was marked by the appointment of an assistant for the Information Officer. This assistant was a transfer from the Division of Plant Operations, and with the

transfer came responsibility for the organizing and staging of official openings of joint OWRC-municipal water and sewage projects.

Another factor which helped increase the branch's work load during the year involved major changes in top staff assignments and a resultant transfer of certain duties to the Information Branch.



All this resulted in a sharp increase in branch activities and responsibilities. Along with the increased tempo occasioned by the official openings, there was noticeable interest in display and publication development as well as the steady business of issuing news releases, keeping members of the legislature informed concerning Commission activities, the placing of advertising, literature distribution, the handling of tender calls and attendance at tender openings, and the taking care of numerous requests for information, by mail, telephone and personal calls

at the office.

A major item was the production and operation of an all-new OWRC exhibit at the Canadian National Exhibition. In cooperation with other Commission sections much new material was prepared for this largest-yet OWRC production at the CNE. The exhibit was well manned by representatives of the various interested divisions and the number and quality of queries made at the exhibit's information booth proved gratifying. From the evident public interest and verbal comments received, the 1963 edition of the Commission's Canadian National Exhibition display could be termed nothing but successful. A feature of the display was an activated technimated display depicting the hydrologic cycle.

Literature distribution during 1963 became a more onerous chore in that Commission policy dictated that a charge be made for certain publications. The recording of such purchases, whether over-the-counter or by mail, or whether paid for or required invoicing, proved most time consuming to the Information Branch as well as to other sections of the Commission involved, the accounts section of the Finance Branch, the two stockrooms and the mail room.

A major highlight of the news release service was the January announcement of the forthcoming, April, retirement of Dr. A.E. Berry as general manager and chief engineer of the Commission, and the appointment of David S. Caverly as general manager in his place. The appointment of two full-time assistant general managers and resultant other shifts in staff also were featured.

Another highlight concerning internal OWRC activities was the appointment of a director for the new Division of Research which up to the time of the appointment had been unmanned.

Other feature news releases concerned the issuance of the Commission's Second Ground Water Bulletin and the following reports--Muskoka lakes water pollution survey, Sudbury District water resources survey, Peel County water resources survey, Carleton County survey of industrial water use and waste disposal, Carleton County water resources and stream pollution survey, Town of Oakville pollution survey report. Also, the awards of 68 construction contracts were announced.

The Commission's expanding algae research program and the award of the 1962 OWRC Distinguished Service Awards also merited special news releases. Others involved a summary of top papers presented at the 10th annual Industrial Waste Conference at Honey

Harbour, Ontario, and an interpretation of an amendment to the OWRC Act whereby public water supply areas could be defined.

A review of material for a new Commission booklet on aquatic plant control was completed on behalf of the Biology Branch, with the Information Branch providing the art work and layout. Fourteen brochures were prepared and published for various official openings during the year.

A complete and extensive photographic filing system was established for color slides and photographs. Staff and outside use of these facilities was steadily increasing. Maintenance of the picture and slide files involved a great deal of photography on the part of branch staff.

The branch arranged 14 official openings during the year as follows:

Belleville	-	June 5
Wellington	-	August 6
Twp. of Kingston	-	August 28
Arthur	-	September 11
Preston	-	September 16
Kitchener	-	September 19
Gananoque	-	October 9
Fort Erie	-	October 12
Moore Twp.	-	October 18
Waterford	-	October 23
Alexandria	-	November 6
Twp. of Michipicoten	-	November 13
Tavistock	-	November 20
Sutton	-	November 26

In conjunction with these official openings, four open houses were held--at Belleville, Kitchener, Preston and Fort Erie. Student education programs were carried out in nine of the municipalities in which official openings were held. This involved 23 talks on water resources and conservation and 23 film showings to students from grades 6 to 13.

The 10th Industrial Waste Conference was attended at Honey Harbour, from which daily reports were phoned to The Canadian Press in Toronto for wide distribution by that news agency. Conference picture-taking was the responsibility of the branch representative also.

The number of requests for literature dealing with the work of the Commission and the field of water resources was the heaviest on record. In addition, hundreds of pieces of literature were handed out at the Commission exhibit at the Canadian National Exhibition.

Speech material was supplied on occasion to various Commission and other government officials.

Other items handled by the Information Branch included production of the staff publication--OWRC News, the editing and production of Commission monthly and annual reports, and the preparation of special articles for various publications.



Legal Branch -- H. Landis, Senior Solicitor

During the year the Legal Branch provided a general advisory service to the Commission and to its personnel, and prepared agreements and other legal documents.

There were several amendments to The Ontario Water Resources Commission Act in 1963:

1. The Public Service Superannuation Act was made applicable to the permanent staff of the Commission except the members of the staff who were members of The Ontario Municipal Employees Retirement System. The Commission's power to make regulations, subject to the approval of the Lieutenant-Governor in Council, was extended to provide for a grievance board and a grievance procedure for its employees.

2. The functions and powers of the Commission were extended to include the dissemination of information and advice with respect to the collection, production, transmission, treatment, storage, supply and distribution of water or sewage, and to charge fees in respect thereof.

3. The power of the Commission to define an area for the protection of a public water supply was broadened subject to an exception, to include the doing of any act or the taking of any water in the area that may unduly diminish the amount of water available in the area.

4. The section dealing with the control of water taking by requiring a permit was clarified and the penalty for contravention of the section or the terms of a permit was increased.

5. Provision was made for a municipality, having a project agreement with the Commission to commute the whole or any part of a sewer or water works rate, for a payment in cash and upon such terms and conditions as may be prescribed.

6. The period within which proceedings may be taken to enforce regulations respecting plumbing was extended from six months to one year.

7. One section of the Act was amended for clarification.

Papers were presented by the Senior Solicitor at the North-eastern Ontario Waterworks Conference and at the annual convention of the Ontario Association of Plumbing Inspectors and Affiliates.

The Senior Solicitor prepared forms of performance and payment bonds for the Ontario Government's Uniform Bond Procedure Committee. The complicated claim against a bond company arising out of the McKim Township project was satisfactorily settled and further progress was made in the Commission's action against the bond company with respect to the Listowel project.

During the year there was a prosecution for breach of the water well regulations and although the action was dismissed at the trial, the Commission succeeded on appeal and a conviction was obtained.

Assistance was provided in the defence of one of the Commission's Coniston project employees in an action brought against him, and the defence was successful.

Personnel Branch -- A.R.W. Uren, Personnel Director

The Personnel Branch experienced an active year. Besides securing new staff to meet authorized complement, maintenance of staff placed a considerable demand on the branch. Many members of staff had been recruited because of special training and skills. Others acquired these in the course of job training while performing their assignments with the Commission. Some of the specialists on Commission staff became the object of tempting offers from other employers. This resulted in some turnover of staff, and owing to the specialized character of some professional positions, replacements were not always readily available.

With the active competition in attracting new university graduates, the Commission faced some difficulties. However, interest among young engineers in professional achievement and a desire to participate in the preservation of the greatest natural resource contributed to Commission success in its expanding program.

Commencing in January and February, recruitment of new graduates to meet the immediate need of the Commission took place. The authorized complement of new graduates was recruited from the University of Toronto, the University of Waterloo and McMaster University.

Recruitment for scientific, technical and administrative positions kept pace with engineering recruitment to help meet the growing demand for Commission services. The record indicated 338 as the total staff complement at the year-end compared with 300 at the end of 1962. Unfilled vacancies in staff comprised approximately three per cent of the maximum.

Significant growth occurred in the complement of operating staff at water and pollution control projects throughout the province. Total staff complement numbered 191 at the end of 1963 compared with 162 the previous year end. New staff was recruited to meet expanding activities at 11 new projects throughout the province.

The turnover in operating staff for the year was less than six per cent of the staff total at the year-end.

Real Estate Branch -- H.H. Mitchell, Chief Property Agent

The year 1963 was an active one for the Real Estate Branch, particularly in the early months when activities were influenced by the federal plan of assistance for water pollution control

projects. Originally, only projects completed by March 31, 1963, had been declared eligible for this financial assistance from the Central Mortgage and Housing Corporation, and late 1962 brought a rush of work in this connection. Much of this activity, as far as the Real Estate Branch was concerned, spilled over into 1963 despite the fact that the original deadline was extended to 1965.

The major difficulty encountered by the branch during the year continued to be the finalizing and closing out of projects. Solicitors employed by the Commission had to be continually reminded to register documents, return registered copies to the Commission, and in many cases even to submit their accounts. In spite of these reminders, however, there was so little improvement that in December, one property agent was assigned the responsibility of closing out all projects and collecting documents. A period of three months was allocated for this work. Results had begun to show by the year's end as evidenced by the statistics below:

	<u>1962</u>	<u>1963</u>
Options held December 31st	430	361
Final documents outstanding December 31st	506	420



Expropriations:

The Commission policy on expropriations remained unchanged during 1963. This policy considered expropriation to be a last resort when all other methods had failed, and was in direct contrast with many government departments where expropriation was used for all purposes, including a conveyancing method. Up to the end of 1963, it had been possible to register expropriations and obtain possession of land in the two or three days lapsing between the signing of the final agreement with the municipality and the awarding of the contract. A new Expropriations Procedures Act was expected to come into force on January 1, 1964, however, and during the last few weeks of the year the question of expropriation procedure in the Commission was under review and a report prepared for submission to the Commission early in the new year.

The following expropriations were approved by the Commission during the year:

Approved for Expropriation	40
Expropriations Registered	20

It can be seen that 50 per cent of the expropriations approved by the Commission were actually registered, almost the same proportion as the previous year. Of the 19 expropriations settled eight were for properties expropriated during 1963 and 11 for properties expropriated earlier. During the year the Commission maintained its practice of seeking to settle expropriations on the original valuation and was successful in all the above cases. The status of expropriations:

Expropriations awaiting settlement	
December 31, 1962	89
Expropriations registered during	
1963	20
Expropriations settled during	
1963	19
Expropriations awaiting settlement	
December 31, 1963	90

The number of unsettled expropriations increased by one during the year, bringing the total outstanding as of December 31

to 90. Of these, approximately one-half were under active negotiation. The others were the cause of some concern as the year ended. They consisted mainly of properties in the very small monetary range and expropriations were registered due to title difficulties. Where owners refused to accept compensation in amounts up to \$250.00 it was not deemed advisable to press for arbitration as the costs involved would be approximately 10 times the value of the compensation offered. Where expropriations had been registered to eliminate title difficulties, there could be no settlement as ownership could not be established, hence the expropriation in the first instance. In all these cases, however, the land had a very nominal value.

Two expropriations were submitted to the Ontario Municipal Board for hearing during the year, the first of these being for an easement in Belleville. This was a matter which should never have proceeded to the board but due to a dispute over the damage caused by the contractor, the owner's solicitors were unable to arrive at any figure acceptable to their client prior to the hearing. However, after only one witness had been called in the hearing an adjournment was obtained and the matter was settled out of court in the sum OWRC previously had offered on several occasions prior to the hearing. The question of division of costs as between the Commission and the contractor still had to be decided.

The second hearing was an extremely important one from the Commission's point of view. It concerned the acquisition of the water pollution control plant site in Paris and lasted six days, with an adjournment of approximately two months between the first and last three days. Hearings of this type normally take two days but in this instance, the owner made strong representations that the mere purchase of land for such a plant automatically depreciated values in the surrounding area. As this involved a precedent which possibly could affect all subsequent OWRC purchases of land the Commission's case was prepared most thoroughly and an exhausting analysis of an area under comparison was made. The owner used the residential area located close to the Elizabeth Gardens Water Pollution Control Plant in Burlington as a basis for his allegations, but the Commission presented evidence to indicate there had in fact been no decrease in property values in this area due to the plant. However, the Board reserved its decision and at the year's end had not announced a decision.

Research:

In connection with the above hearing it was fortunate that

the Real Estate Branch had commenced a research program during the summer of 1963 aimed at establishing the effect of the location of such plants upon surrounding land values. Twenty-three plant sites were inspected during the summer and information on surrounding land values was obtained on 14. Considerably more information of this nature would be required before the material could be processed and used in evidence in arbitration proceedings. However, the results obtained indicated far less adverse effect on values, even on residential land, than popularly supposed. Plans were made to continue this program during 1964.

Taxes:

The policy on taxation was reviewed again in 1963 and from spot sampling of assessments it was discovered that in some instances, at least, these were unrealistic. Since the assessment of a water pollution control plant or water filtration plant was something encountered by many assessors only once, and as these particular structures were not covered in detail in the Assessment Manual errors tended to arise.

It was decided, therefore, that the Real Estate Branch would check assessments in the field when time permitted, and would appeal one assessment on each type of property. Assuming the appeal was resolved in favor of the Commission this would then be used as a precedent for future assessments on this type and it was intended that brief instructions on the correct method of assessment together with a summary of the results of the appeal would be sent to assessors where it was felt an incorrect assessment had been made. It was anticipated that by using this method OWRC could avoid continuous appeals. It had been found by experience that, in most cases, assessors looked to the Commission for guidance. It was decided to deal first with lagoons and at the year's end arrangements were underway for an appeal in the county court of the assessment of the Lindsay lagoons as the first step of this program.

Indications at the year's end were that increasing importance would be given in 1964 to arbitration hearings, assessment appeals, legal documentation and the land value research program.

Total value of properties acquired during 1963 reached a record figure of \$808,381.00.

Division of Construction

A. W. Shattuck, Director
J. C. F. Macdonald, Assistant Director

There was a sharp drop in the value of contracts entered into in 1963 as compared to 1962, probably brought about, partially, at least, when Central Mortgage and Housing Corporation extended the period during which it would finance sewerage projects. There had been a concerted effort to get as much work done as possible during the original period of C.M.H.C. financing but once the extension of time was made there was not the same urgency to get on with these projects.

In 1963 the Commission entered into 58 contracts valued at \$16,553,518.46, of which \$15,363,267.50 was for sewage contracts and \$1,190,250.96 was for water contracts.

During the year the value of 86 contracts completed was \$21,978,254.96. Water contracts totalled 23 and amounted to \$2,884,217.72, while 63 sewage contracts completed amounted to \$19,094,037.24. All project costs in this report exclude subsidies.

A brief summary of each Commission project on which work was done during the year follows:

Alexandria (62-S-132)

Description of Project:	Trunk sewer, pumping station, forcemain and lagoons.
Consulting Engineers:	J. L. Richards & Associates Ltd., Ottawa.
Completed:	August
Estimated Project Cost:	\$193,690.00

The contract was awarded late in December, 1962, and work commenced in January. The contractor was held back at first by extreme low temperatures and later by flooding and soft soil conditions at the lagoon area. The project was substantially completed in August and went into operation in October. Additional work ordered by the municipality for repairs on existing sewers was completed by the end of the year.

Almonte (62-S-130)

Description of Project:	Sewage lagoon, one pumping station, 12" forcemain and a connecting sewer.
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Consulting Engineers: J. L. Richards & Associates Ltd.,
Ottawa.

Completed: June

Estimated Project Cost: \$239,000.00

The contract for this project was awarded in November, 1962. Sewer, pumping stations and forcemain were completed by the end of May while the lagoons were substantially completed by the end of June.

Twp. of Anson, Hindon and Minden (61-W-81)

Description of Project: Contract 1 - Watermains and pumping station.
Est.contract cost--
\$115,000.00
Contract 2 - Extensions of watermains.
Est.contract cost--
\$ 8,000.00

Consulting Engineers: R. V. Anderson & Associates Ltd.,
Toronto.

Expected Completion Date: April, 1964

Estimated Project Cost: \$146,000.00

Contract No. 1 was completed before Christmas, and work on Contract No. 2 was to be carried out during the winter works period of early 1964.

Arthur (62-S-114)

Description of Project: Sewers, pumping station, forcemain and a two-cell lagoon.

Consulting Engineers: Philips & Roberts Ltd., Burlington.

Completed: June 25.

Estimated Project Cost: \$194,717.00

Armstrong Bros. Ltd., completed its contract requirements satisfactorily and the system was put into operation. Due to the Ontario Department of Highways performing a contract in the same location as the OWRC project, the general contractor was obliged to postpone certain clean-up items until the spring of 1964. These minor items consisted of final grading, sodding, seeding and asphalt reinstatement.

Beaverton (61-W-83(2))

Description of Project: Contract 1 - Additional water treatment facilities.
Est.contract cost -
 \$50,207.35.

Contract 2 - Water distribution system.
Est.contract cost -
 \$ 9,805.56.

Consulting Engineer: T. R. Cooil, Toronto

Completed: Contract 1 - August 2
Contract 2 - August 2

Estimated Project Cost: \$78,000.00

Contract 1 started in 1962, was put into operation in time to handle peak flows although the deficiencies were not all disposed of before August.

The mains included in Contract 2 were laid and tested during the winter of 1962-63. Surface restoration was completed in the summer.

Belle River (63-W-111)

Description of Project: Contract 1 - 36' water intake and crib.
Est.contract cost -
 \$80,469.44

Contract 2 - Addition to water treatment plant.
Est.contract cost -
 \$61,570.00

Consulting Engineers: C. G. Russell Armstrong, Windsor

Completed: Contract 1 - December 1
Expected Completion Date: Contract 2 - February, 1964

Estimated Project Cost: \$160,425.00

Construction was started in September and the water intake and crib were completed by December 1st. Work was delayed on the plant addition due to the late placement of steel sheet piling for the retaining wall.

Brampton/Twp. of Chinguacousy (58-S-14)

Description of Project: Water Pollution Control Plant
 Consulting Engineers: Proctor & Redfern, Toronto
 Completed: August 9.
 Estimated Project Cost: \$375,000.00

Work, started in the fall of 1962, proceeded through the winter without excessive delays and the plant was put into operation in July.

Brampton/Twp. of Chinguacousy

Description of Project: Tertiary treatment pilot plant
 Consulting Engineers: Proctor & Redfern, Toronto
 Expected Completion Date: February, 1964
 Estimated Project Cost: \$26,000.00

Work started in December and although hampered by frost and snow it was anticipated that the cells might be put into operation before the end of this winter.

Twp. of Brantford (62-W-99)
St. George Area

Description of Project: Contract 1 - Elevated water storage tank of 200,000 I.G. capacity.
 Final contract cost - \$63,975.91
 Contract 2 - Watermains.
 Final contract cost - \$38,446.13
 Consulting Engineers: Gore & Storrie Ltd., Toronto
 Completed: Contract 1 - July 15
 Contract 2 - December 11, 1962
 Estimated Project Cost: \$118,793.00

After the fabrication of components for the elevated structural steel water storage tank in the workshops by Dominion Bridge Co. Ltd., erection of the tank started at the Francis Street site early in the spring of 1963. Progress was slow on account of necessary field trimming of plates and lack of weld penetration on the riser pipe. The final work was very satisfactory, however. A further de-

lay in time was caused by high winds making erection work most difficult at times and on other occasions impossible.

Burlington (62-S-105)

Description of Project: Water pollution control plant
Consulting Engineers: James F. MacLaren Ltd., Toronto
Completed: July
Estimated Project Cost: \$2,040,988.00

This plant included a pumping station, grit building, blower building, aeration tanks, final settling tanks and sludge holding tank. Initial capacity - 3.0 m.g.d. The aeration tanks were sized to treat 12 m.g.d. and in the early stages of operation sewage was treated by the total oxidation process.

The structural work was completed in the early part of the year and the installation of equipment proceeded until June. Outside operations resumed in the spring and the plant was tested and accepted in July after a week's operation using water from Hamilton Bay.

Owing to delay in receipt of O.M.B. approval for the construction of trunk sewers, less than 250,000 gallons per day was available at the plant and it was decided to continue to pump this flow to the Drury Lane plant until construction of new sewers was under way. The plant was put into continuous operation in mid-December.

Burlington (62-S-133)

Description of Project: Contract 1 - 3,700 lin.ft. of 72" dia. sewer from Highway #2 to the WPCP.
Est.contract cost - \$287,500.40
Contract 2 - 5,700 feet of sanitary sewers and 4,200 feet of forcemain along Lakeshore Rd.
Est.contract cost - \$196,580.33
Contract 3 - Pumping station No.10 on Lakeshore Rd.
Est.contract cost - \$133,572.25
Consulting Engineers: James F. MacLaren Ltd., Toronto

Completed:	Contract 1 - July
	Contract 2 - October
	Contract 3 - December

Estimated Project Cost: \$758,793.00

Contract 1 - Sections of this sewer were constructed on timber piles with a concrete cap. The work commenced in February, progressed smoothly and was completed within the contract time.

Contract 2 - These sewers and forcemains interconnect existing pumping stations Nos. 6 and 9 with pumping station No. 10 which resulted in the possibility of diverting part of the flow of sewage from Elizabeth Gardens plant to the Drury Lane plant. The contractor carried out the work expeditiously and tidily despite the restricted working area along the lakeshore. Work extended from May until October.

Contract 3 - Construction of this pumping station commenced in July, and should have been completed by October 31st, but slow delivery of equipment was partly to blame for the delay. Initial operation took place in December.

Burlington (62-S-135)

Description of Project:	Approximately 850 feet of 48" dia. sewer in the vicinity of the A.E.W. - No. 2 highway cloverleaf.
Consulting Engineers:	James F. MacLaren Ltd., Toronto
Completed:	August
Estimated Project Cost:	\$71,375.00

Construction was carried out during the months of June, July and August. No difficulties were encountered.

Chatham (62-S-102)

Description of Project:	Contract 1 - Water pollution control plant Est.contract cost - \$1,518,749.00
	Contract 2 - Interceptor sewers, forcemain and pumping station. Est.contract cost - \$218,298.00
	Contract 3 - Interceptor sewers, forcemains and two

pumping stations.
Est. contract cost -
\$367,595.95

Contract 4 - Interceptor sewers,
forcemains and two
pumping stations.
Est. contract cost -
\$522,476.00

Consulting Engineers: Todgham & Case Ltd., Chatham
Gore & Storrie Ltd., Toronto

Expected Completion Date: September 1964

Estimated Project Cost: \$3,146,343.00

Construction was commenced in July and by the end of the year the water pollution control plant was approximately 50% completed and the sanitary sewer contracts were 60% completed.

Chesley (62-S-109)

Description of Project: Sanitary sewerage system including three pumping stations, forcemains, sewers and stabilization ponds.

Consulting Engineers: Hisey & Barrington, Richmond Hill

Completed: August

Estimated Project Cost: \$272,500.00

Work resumed in April and the remaining sections of sewer and forcemains were laid. Wet weather delayed construction of the lagoons but these were completed in July. Testing and initial operation of the main pumping station delayed the substantial completion of the project until August.

Moore Twp. (Corunna) 61-S-88)

Description of Project: Contract 1 - Sanitary sewer system
Est. contract cost -
\$367,069.66

Contract 2 - Water pollution control
plant
Est. contract cost -
\$299,090.51

Consulting Engineer: Contract 1 - J. D. Nisbet, Sarnia
Contract 2 - James F. MacLaren Ltd.,
Toronto.

Completed: October 16
Estimated Project Cost: \$830,170.00

Construction commenced in the fall of 1962 and the plant and sanitary sewer system were placed in operation in October, 1963.

Elmira (61-S-96)

Description of Project: Joint sewage treatment plant with Naugatuck Chemicals including out-fall sewer.
Consulting Engineers: Canadian-British Engineering Consultants, Toronto.
Expected Completion Date: December 2, 1964
Estimated Project Cost: \$614,000.00

Construction was commenced on December 16, and only construction of a permanent access road and railway crossing was accomplished before the end of the year.

Elmvale (62-S-118)

Description of Project: Contract 1 - Forcemain and sewage lagoon.
Est.contract cost - \$53,899.04
Contract 2 - Sewers and pumping station.
Est.contract cost - \$95,946.33
Consulting Engineers: Proctor & Redfern, Toronto
Expected Completion Date: September, 1964
Estimated Project Cost: \$180,000.00

Contract 1 - Work on the lagoon resumed in June after the ground had dried up. The forcemain was successfully tested and this contract was completed in August.

Contract 2 - Slow progress continued during the early months of the year during which time the 8" dia. sewers were laid. Work resumed on Amelia Street in April. When the contractor attempted to test certain sections of sewer which had been laid it was found these were faulty and he was instructed to cease laying sewers until all those already laid were tested. Further faults became evident and the contractor ceased work on the job, maintaining that the contract had been terminated.

Later television inspection and flushing and cleaning of the sewers was carried out and expert opinion was engaged by the Commission to give advice in view of possible litigation. It was hoped the complete system would be in operation by late fall 1964.

Elora (62-S-125)

Description of Project:	Contract "A" - Sanitary sewers, pumping station and forcemain. Est.contract cost - \$231,000.00
	Contract "B" - Water pollution control plant. Est.contract cost - \$106,000.00

Consulting Engineers:	R. V. Anderson & Associates Ltd., Toronto.
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Expected Completion Date:	Contract "A" - October 7, 1964
	Contract "B" - July 13, 1964

Estimated Project Cost:	\$380,000.00
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Contract "A" for sewers was let in October and at the end of 1963, 35 per cent of the work had been finished. This was 10 per cent ahead of schedule.

Contract "B" for the water pollution control plant was awarded in October and by the end of the year about 30 per cent of the work had been completed.

Progress was as scheduled.

Englehart (62-S-131 & 62-W-106)

Description of Project:	Water and sewer mains
Consulting Engineers:	Sutcliffe Co., New Liskeard
Completed:	July 30
Estimated Project Cost:	\$7,600.00

The sewer was laid shortly before Christmas 1962 and the water main in the spring of 1963. The works were constructed by the municipality's own forces under the supervision of the consulting engineer.

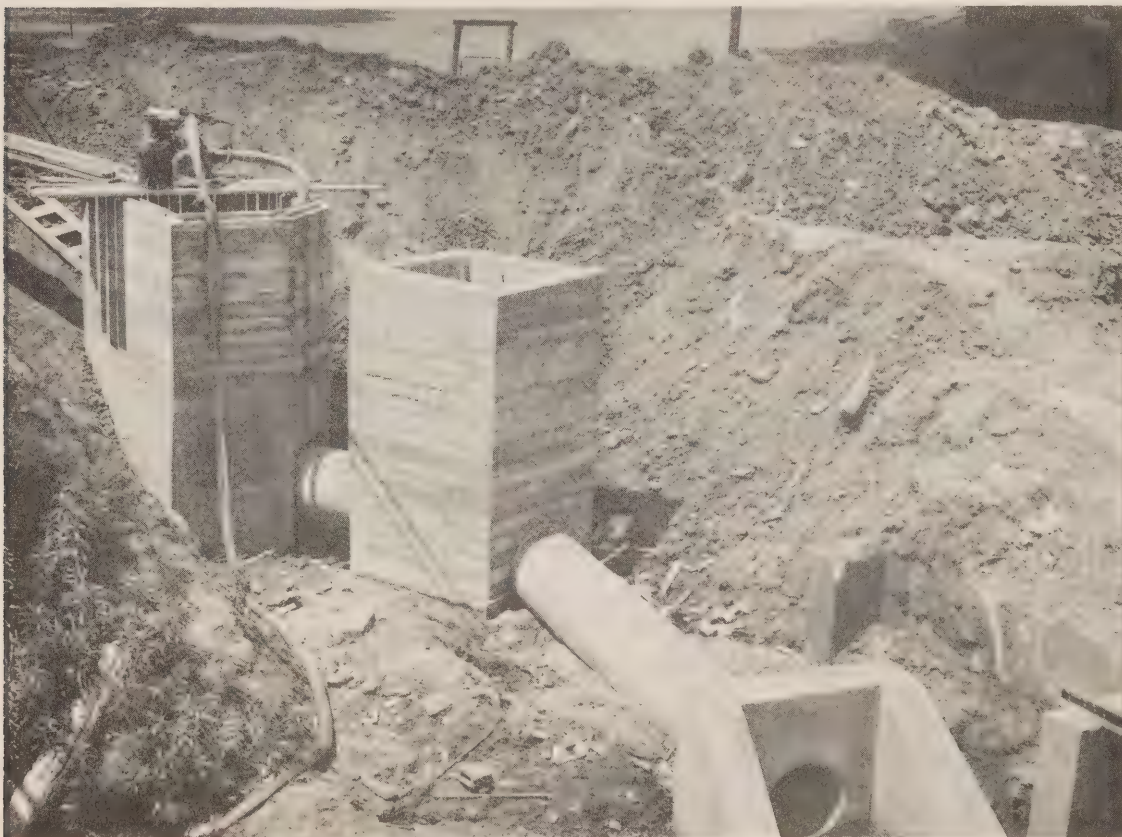
Essex (63-W-114)

Description of Project:	Relocation of watermains and service
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to provide adequate cover as a result of realignment of Highway #18 between Leamington and Kingsville by the Ontario Department of Highways.

Consulting Engineer: C. G. Russell Armstrong, Windsor
Expected Completion Date: February, 1964
Estimated Project Cost: \$51,000.00

This work was carried out to meet the scheduling of the highway contractor and therefore was spread out for a considerable length of time. One further section of approximately 150 feet of main required lowering.



Exeter (61-S-93)

Description of Project: Extension to the sewer system, two pumping stations, forcemain and a two-cell lagoon.
Consulting Engineer: B. M. Ross, Goderich

Completed: October 3
Estimated Project Cost: \$348,120.00

The general contractor, John Gaffney Construction Co. Ltd., satisfactorily completed the requirements of the contract early in October.

Fort Erie (59-S-39)

Description of Project: Contract "A" - Sanitary trunk sewer, river outfall and access road.
Est.contract cost - \$246,642.43

Contract "B" - 2.0 M.G.D. primary water pollution control plant and pumping station.
Est.contract cost - \$550,680.00

Consulting Engineers: Canadian-British Engineering Consultants, Toronto.

Completed: Contract "A" - April 10
Contract "B" - October 7

Estimated Project Cost: \$920,000.00

The construction of the trunk sewer was accomplished without difficulties. The river outfall required slight revisions in design and anchoring of the pipes. The construction of the access road to the plant was considerably delayed due to ownership difficulties on Maple Avenue. The finished work was fully satisfactory.

Several delays occurred during the construction of the water pollution control plant. The influent pipes to both primary clarifiers required design and material changes.

The foundation of the sewage pumping station had to be raised and the control of the sewage pumps altered due to severe water infiltration into the excavation. The final result was a more suitable pumping station at only slightly higher cost.

The water pollution control plant, pumping station and trunk sewers were taken into operation on October 7th. Except for some minor adjustments, the plant was working satisfactorily as 1963 ended

Fort Frances (60-S-59)

Description of Project: Contract "A" - Water pollution

	control plant.
	Est.contract cost -
	\$783,351.00
Contract "B"	West end interceptor
	sewers.
	Est.contract cost -
	\$505,000.00
Contract "C"	East end interceptor
	sewers.
	Est.contract cost -
	\$335,198.19
Contract "D"	Two sewage pumping
	stations
	Est.contract cost -
	\$150,000.00

Consulting Engineers: W.L.Wardrop & Associates Ltd.,
Winnipeg

Expected Completion Date: April, 1964

Estimated Project Cost: \$2,050,000.

All four contracts were executed February 21st, and work commenced shortly afterwards. Initial progress on Contract "A" was slow owing to the contractor's difficulties in sinking the bearing piles for the main building and primary tanks due to the presence of a layer of boulders and heavy ground water flow just above bedrock. After some changes were made in the piling, progress improved and by the end of the year this contract was about 75% completed.

Progress on contracts "B" and "C" was quite good although the type of ground encountered in different areas necessitated well-pointing, close steel sheeting or blasting in very hard rock. These contracts were substantially completed during the year.

Progress on Contract "D" was slow owing to delayed delivery of the two factory built sewage pumping stations and the power transformers. By the end of the year this contract was about 90% completed.

Fort William (61-S-91)

Description of Project: Construction of water pollution control plant and related works.

Contract "A" - Placing fill at WPCP site for preloading.
Final Contract Cost - \$36,935.98

Contract "B" - Well-point dewatering of WPCP site for preloading.
Final Contract Cost - \$66,364.86

Contract "C" - Water Pollution Control Plant.

Est.Contract Cost -
\$2,151,817.00

Contract "D" - Manufacture of concrete sewer pipe.

Final Contract Cost -
\$38,556.64

Contract "E" - Influent and outlet sewers.

Final Contract Cost -
\$196,246.85

Consulting Engineers: W. L. Wardrop & Associates Ltd.,
Winnipeg.

Expected Completion Date: March, 1964

Estimated Project Cost: \$2,800,000.00

Contract "A" was completed in 1962 but Contract "B" continued into 1963 until work commenced on Contract "C".

Contracts "C" and "E" were executed in January and work commenced shortly afterwards.

Very good progress was maintained on Contract "C" which by the end of the year was about 90% completed and well ahead of schedule. Favorable weather conditions in the fall helped considerably in achieving this.

Pipe manufacture under Contract "D" was completed and all the pipe (66" and 42" dia.) was installed under Contracts "C" and "E". Contract "E" was completed by mid-August but the sewers could not be put into operation until the plant had been completed.

Frankford (63-W-109)

Description of Project: Contracts "A" & "C" - Extensions to existing watermains.
Est.contract cost -
\$37,610.50

Consulting Engineers: Franklin McArthur & Associates Ltd.,
Downsview

Expected Completion Date: January 14, 1964

Estimated Project Cost: \$42,400.00

The work commenced on August 30th and was substantially completed by the end of the year.

Frankford (63-S-140)

Description of Project: Contract "A" - Extension of existing sewers

Consulting Engineers: Franklin McArthur & Associates Ltd., Downsview

Expected Completion Date: January 14, 1964

Estimated Project Cost: \$55,309.00

The work commenced on September 4th and was proceeding on schedule by the end of the year.

Galt (61-S-90)

Description of Project: Water pollution control plant

Consulting Engineers: Proctor & Redfern, Toronto

Completed: July

Estimated Project Cost: \$1,373,615.00

Though the structural work on this contract was almost completed before the start of 1963, progress was very slow over the last six months of construction. Rehabilitation of the existing digester caused some problems but the plant eventually was put into operation without the use of the digester.

Gananoque (62-S-127)

Description of Project: Contracts "A" & "B" - Sanitary sewers, pumping station and forcemain.
Est.contract cost - \$353,352.55

Contract "C" Lagoons
Est.contract cost - \$196,230.00

Consulting Engineers: Proctor & Redfern, Toronto

Completed: Contracts "A" & "B" - June
Contract "C" - September

Estimated Project Cost: \$630,608.00

Contracts "A" and "B" were awarded on January 8th and completed on June 18th.

Contract "C" was awarded on November 27, 1962 and completed on September 30th.

Geraldton (63-W-115)

Description of Project: A 12" dia. water supply main from Reesor Lake to the elevated tank in the town.

Consulting Engineers: W. L. Wardrop & Associates Ltd., Winnipeg.

Expected Completion Date: May, 1964.

Estimated Project Cost: \$140,000.00

The order to commence work was issued the contractor December 31st, the required time for completion being 20 weeks.

Harrow (63-W-108)

Description of Project: Contract 1 - 250,000 Imperial gallon elevated steel water tank.
Est.contract cost - \$67,985.00

Contract 2 - Tank foundations, valve chamber and site work.
Est. contract cost - \$19,869.73

Consulting Engineer: C. G. Russell Armstrong, Windsor

Completed: December 1

Estimated Project Cost: \$102,573.00

The foundations for the tank were completed in the late spring. Erection of the elevated tank was held off until the fall to take advantage of the winter works incentive program. The elevated tank with the exception of painting was completed by December 1st. Painting was scheduled for the spring of 1964.

Kincardine (62-S-110)

Description of Project: Service connections, trunk sewers, two pumping station, forcemain and lagoon.

Consulting Engineers: M. M. Dillon & Co. Ltd., London

Expected Completion Date: July, 1964

Estimated Project Cost: \$507,152.00

Construction commenced in July and good progress was made on the lagoons by November when this phase of the work was halted for the winter. Approximately 65% of the forcemain was installed and 40% of the sewers. The contractor had to be constantly reminded about testing and clean-up. No work on the pumping stations was started before the year-end.

Twp. of Kingston (61-S-98)

Description of Project:	Contract "A" - This contract consisted of 5 sections.
	Section 1 - Three pumping stations Est.contract cost - \$119,257.00
	Section 2 - Outfall sewer from plant to lake. Est.contract cost - \$103,000.00
	Section 3 - Trunk sewer Est.contract cost - \$130,913.62
	Section 4 - Sanitary sewers Est.contract cost - \$277,009.17
	Section 5 - Sanitary sewers Est.contract cost - \$445,736.47
	Contract "B" - Water pollution control plant Est.contract cost - \$416,620.30
Consulting Engineers:	Contract "A" - Campbell Smith Ltd., Kingston
	Contract "B" - R. V. Anderson & Associates Ltd., Toronto.
Completed:	Contract "A"
	Section 1 - August, 1963
	Section 2 - December, 1962
	Section 3 - December, 1962
	Section 4 - May, 1963
	Section 5 - March, 1963
	Contract "B" - September, 1963

Estimated Project Cost: \$1,534,355.66

Construction of Contract "A" commenced in September, 1962, and was generally completed in August, 1963.

Construction of Contract "B" commenced in July, 1962, and was completed in September, 1963.

Kitchener (58-S-19)

Description of Project: Extension to existing water pollution control plant to add secondary treatment.

Consulting Engineers: Proctor & Redfern, Toronto

Completed: August

Estimated Project Cost: \$1,650,000.00

The main structural work was completed early in the year. Progress was a little slower in the latter stages as much of the work involved existing structures and equipment. The extension was put into operation in August and from then until November, the contractor worked intermittently on contract deficiencies.

Lindsay (62-S-124)

Description of Project: Sanitary trunk sewer, prefabricated underground sewage pumping station, 14" and 16" dia. forcemains, a six-cell, 110-acre sewage lagoon with outfall to the Scugog River.

Consulting Engineers: Oliver Lloyd & Associates Ltd.,
Don Mills

Completed: November 22.

Estimated Project Cost: \$400,670.00

The late start of construction work on December 3, 1962, permitted only the installation of the section of the sanitary sewer from the abandoned water pollution control plant to the new sewage pumping station, and a section of the 14" dia. forcemain from the latter station to the Scugog River and under the river bed, before the spring thaw.

On account of extremely wet and soft ground conditions in the lagoon area, progress in constructing the lagoon cells could only be made in late June, and work continued until late in November.

The pumping station was installed during July and August, and sewage was pumped into lagoon cell #2 about the middle of August.

All lagoon cells were in operation on November 22nd and all fencing completed. Approximately two-thirds of the lagoon berms were seeded with grass. The remaining one-third would have to be seeded in the spring of 1964.

Difficulties were experienced with the pumps of the sewage pumping station. Apparently the pump rating curves of the fabricators did not agree with the curves based on field tests. Further investigations were under way as 1963 ended.

Township of Louth (63-W-107)

Jordan Village & Jordan Station, Water Area #8

Description of Project:	Contract 1 - Water distribution mains. Est.contract cost - \$137,426.00
	Contract 2 - Concrete water reservoir. Est.contract cost - \$29,371.00
Consulting Engineers:	Proctor & Redfern, Toronto and St.Catharines.
Completed:	December 30
Estimated Project Cost:	\$192,797.00

After a delayed start of construction of the water distribution system on account of late receipt of approval from the Ontario Municipal Board, the installation of the mains progressed at a better than expected rate favored by dry weather conditions during the fall. The contract was substantially completed in December, with the exception of a number of house-service connections from the main to the property lines. The distribution system was taken into service, after disinfection, on December 30th.

The construction of the concrete water reservoir was started during the first part of October, and was substantially completed by the end of December. It was taken into service together with the water distribution mains on December 30th.

Twp. of Markham (61-S-97B)

Description of Project:	Contract 1 - Sanitary trunk sewer, Stage 3, from Clark St. to John St. along West Branch of Little Don River. Final contract cost - \$34,000.45
	Contracts 2 & 5 - Sanitary sewers, service connections,

storm sewers, road restoration work in the Highland Park Subdivision.

Est.contract cost -
\$522,262.41

Contract 3 - Sanitary sewers and service connections in the Doncaster Subdivision.

Est.contract cost -
\$95,598.52

Contract 4 - Sanitary sewers and service connections in the Thornhill Subdivision and trunk sewers in the Meadowview part of Highland Park Subdivision.

Est.contract cost -
\$181,741.39

Consulting Engineers: Crysler, Davis & Jorgensen Ltd., Willowdale.

Completed: Contract 1 - October, 1962

Contracts 2 & 5 - July 15 (#2)
Oct. 4 (#5)

Contract 3 - September 9

Contract 4 - September 1

Estimated Project Cost: \$833,602.77

Contract 1 - Sanitary trunk sewer, Stage #3, was completed October 14, 1962, and immediately taken in service.

Contracts 2 and 5 - Sanitary and storm sewers, including road restoration, were done simultaneously and was started on October 29, 1962. The progress made in November was fair in some sections and very difficult in other sections on account of bad ground conditions, deep installation of some storm sewers and interference from discharge of ill functioning septic tanks. The streets also became impassable for pedestrians and motor vehicles on account of heavy rain and work was stopped on December 7, 1962.

Work was started again by a small crew during April, 1963, and full construction work resumed early in May.

Further difficulties were experienced on account of bad ground conditions and heavy rainfall. However, good progress was made with the arrival of the warm weather and the general work turned out very satisfactory.

Contract 3 - Sanitary sewers and house-service connections to the property line. Work was started on November 30, 1962, and was continued through the winter months. Here again ground conditons were difficult causing cave-ins and over-excavation of material. The contract was substantially completed however, by September 23rd.

Contract 4 - Sanitary sewers and house service connections to the property line. A section of the sanitary trunk sewer on Yonge St. was added to the original contract due to widening of Yonge St. by the Ontario Department of Highways, necessitating relocation of the sewer. In addition, rezoning from residential to light industrial and commercial in the Meadowview Area of the Highland Park subdivision required a change in the design and relocation of the trunk sewer. This section also was added to the original contract.

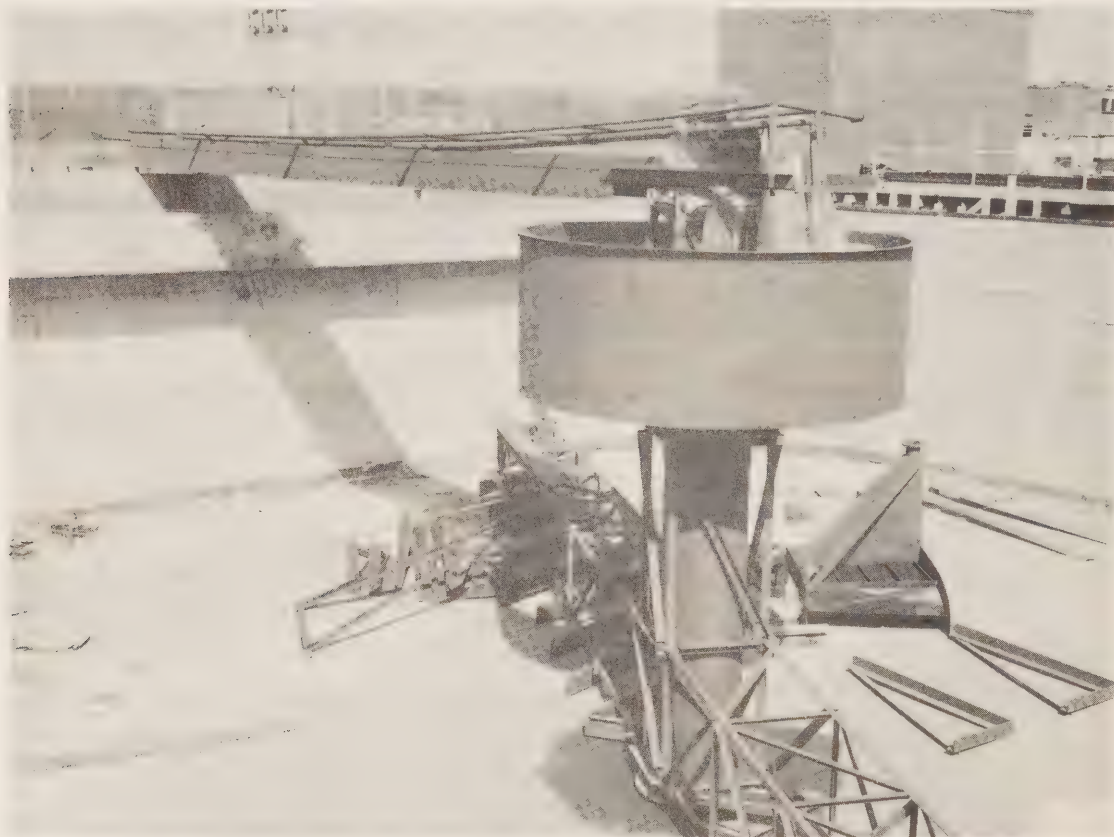
Twp. of Markham (62-W-104)

Description of Project:	Contract 1 - Steeles Avenue water-mains. Final contract cost - \$101,284.82
	Contract 2 - Rehabilitation of existing water treatment plant on Steeles Avenue and the two deep wells at Leslie Street (#2) and at the German Mills Road (#3). Est. contract cost - \$175,775.00
Consulting Engineers:	Crysler, Davis & Jorgensen Ltd., Willowdale.
Expected Completion Date:	Contract 1 - Completed Sept. 30 Contract 2 - March 1, 1964
Estimated Project Cost:	\$288,000.00

The 12" dia. water distribution mains of ductile iron and the 12" dia. asbestos cement supply main with connections to the water treatment plant on Steeles Avenue were installed during the first half of 1963 and connected to the existing water distribution system.

Work on the rehabilitation of the water treatment plant and the

two deep wells were started in November, and progressed satisfactorily to the end of the year. However, it was found that the frost damage to structures and equipment was considerably higher than anticipated. All facilities were expected to be in proper operation by March, 1964.



Mattawa (62-S-112)

Description of Project:	Sewers, pumping station, force-main and multicell lagoon.
Consulting Engineers:	Sutcliffe Co., New Liskeard
Expected Completion Date:	January, 1964
Estimated Project Cost:	\$275,000.00

Work started as soon as weather permitted in the spring and virtually was completed by December. Considerably more boulders, ranging in size from 12 inches to 12 feet were encountered than had been anticipated.

Twp. of Michipicoten (Wawa) (62-S-106)

Description of Project: Purchase of existing sewerage system and addition of trunk sewer and stabilization ponds.

Consulting Engineer: R. S. MacLennan, North Bay

Completed: July

Estimated Project Cost: \$366,550.00

Work was closed down for the winter near the end of January. Following the spring break-up work was resumed and completed by early July.

Twp. of Michipicoten (Wawa) 62-W-105

Description of Project: Purchase of existing water supply system from Algoma Ore Properties.

Consulting Engineer: R. S. MacLennan, North Bay

Estimated Project Cost: \$108,260.00

An agreement to purchase the existing system was negotiated, but detailed drawings of the system had not been received by the end of the year.

Twp. of Neelon & Garson (63-W-112)

Description of Project: Extensions to the existing system of watermains.

Consulting Engineer: L. M. Koett, Township Engineer, Garson.

Completed: November

Estimated Project Cost: \$103,000.00

Work commenced in August. The soil was sandy and progress was good. Some rock was found near the railway crossing but this did not present any problems.

New Hamburg (60-S-56)

Description of Project: Sanitary sewers, pumping station, forcemain and lagoon.

Consulting Engineers: McCargar, Filer and Hachborn, Kitchener

Completed: July

Estimated Project Cost: \$456,000.00

The second extension to the system was completed in July.

Newmarket/Twp. of East Gwillimbury (61-S-87)

Description of Project: Contract 2 - Joint water pollution control plant of 2.0 M.G.D. capacity
Est.contract cost- \$916,070.00

Contract 3 - Sewer bypass, diversion manhole and headwall structure.
Final contract cost - \$7,438.54

Consulting Engineers: Contract 2 - James F. MacLaren Ltd., Toronto.

Contract 3 - Cumming-Cockburn & Assoc.Ltd.,Willowdale.

Expected Completion Date: Contract 2 - October 19, 1964

Contract 3 - Completed February 1

Estimated Project Cost: \$1,182,237.54

After the completed installation of the central & eastern trunk sewers in Newmarket and East Gwillimbury, it became necessary to construct bypass manhole #118, the bypass sewer section and the head-wall structure to take the trunk sewer system into operation.

The construction of the water pollution control plant started officially on July 23. Foundation difficulties occurred due to poor soil conditions but these were overcome and progress was excellent. By the end of 1963 all buildings were completed structurally and equipment was at the site ready for installation.

Niagara (62-S-107)

Description of Project: Sanitary sewers, forcemains, three sewage lift stations and two-cell lagoon.

Consulting Engineers: Douglas G. Ure & Sons, St.Catharines.

Completed: October 23

Estimated Project Cost: \$328,908.00

Construction work started in early May, under favorable ground and weather conditions, with several crews on sanitary sewer and forcemain installation and on the required earthwork for the forming of the two-cell lagoon. All three sewage lift stations arrived when

required. On October 23, the entire system was tested and taken into operation.

Owen Sound (60-S-68)

Description of Project: Contract 4 - Storm sewers in four sections of the municipality.

Consulting Engineers: Gore & Storrie Ltd., Toronto

Expected Completion Date: September, 1964

Estimated Project Cost: \$517,056.00

Construction commenced in November and proceeded in two areas of the city. Ground water conditions made laying of pipe difficult in one section.

Paris (59-S-34)

Description of Project: Contract "A" - Water pollution control plant, total oxidation
Est.contract cost - \$199,366.00

Contract "B" - Trunk sewers and built-in-place pumping station.
Est.contract cost - \$488,452.00

Consulting Engineers: J. D. Lee & Co. Ltd., Kingston

Completed: Contract "A" - November, 1962
Contract "B" - September

Estimated Project Cost: \$848,958.00

Contract "B" - The installation of the trunk sanitary sewers was completed by September 1st, but the contractor was unable to obtain the specified exfiltration test on approximately \$40,000.00 worth of 15" dia. concrete sewer. An addendum extending the guarantee period was prepared and presented to the Commission for approval.

Port Arthur (62-S-101)

Description of Project: Contract "A" - Extension of sanitary trunk sewer.
Final contract cost - \$395,493.66

Contract "B" - Extensions to
water pollution
control plant.
Final Contract Cost -
\$270,867.22

Consulting Engineers: R. V. Anderson & Associates Ltd.,
Toronto
Expected Completion Date: July
Estimated Project Cost: \$787,000.00



Contract "A" was completed in 1962 and the order to start for Contract "B" was given in mid-November 1962.

Delays on the part of certain equipment suppliers set back progress on the works but in spite of this the contractor had the works substantially completed by the required date of July 18th. The extensions increased the capacity of the plant to 4.0 m.g.d. and provided increased capacity for handling excessive storm flows.

Port Colborne (62-S-108)

Description of Project: Fretz Development sewage system including sewage lift station and forcemains.

Consulting Engineers: Canadian-British Engineering Consultants, Toronto.

Completed: December

Estimated Project Cost: \$310,000.00

The project was a very difficult one considering that every foot of trench required drilling, loading and blasting. However, work proceeded satisfactorily and was finished ahead of schedule.

Port Credit (61-S-89)

Description of Project: Contract "A" - Sanitary sewers, force-main and sewage lift station.
Final contract cost - \$174,794.11

Contract "B" - Standby generating equipment. Final contract cost - \$8,858.00

Contract "C" - Alterations to three existing sewage lift stations.
Final contract cost - \$17,901.23

Contract "E" - Additional sanitary sewers. Final contract cost - \$14,826.70

Consulting Engineers: Franklin McArthur Associates Ltd., Downsview

Expected Completion Date: June

Estimated Project Cost: \$260,000.00

Contracts "A" and "B" were completed in 1962 but it was found in 1963 that part of the underground electrical supply cable installed under Contract "A" was faulty. Attempts to locate and repair the faults were not successful as further deterioration occurred when the power was applied. In November a new cable was laid at the contractor's expense to replace the faulty section.

Contract "C" was completed by February 20th.

Work on Contract "E", covering some additional sewers requested by the municipality, commenced at the beginning of May, and was satisfactorily completed about a month later.

Port Dover (62-S-115)

Description of Project: Contract 1 - Water pollution control plant and pumping station #1.
Est.contract cost - \$390,000.00

Contract 2 - Trunk sewers and pumping stations #2, 3 and 4.
Est.contract cost - \$276,000.00

Consulting Engineers: M. M. Dillon & Co. Ltd., London

Expected Completion Date: July, 1964

Estimated Project Cost: \$730,000.00

Contract No. 1 commenced in September and progressed steadily to the end of the year. It was not anticipated there would be any interruption in progress during the winter months.

All sewer and forcemains included in Contract No. had been installed by the end of the year but due to weather conditions it was expected there would be a delay of two to three months in the construction of the outfall sewer. Work was to be resumed in late March, 1964.

Powassan (62-S-137)

Description of Project: Pumping station, forcemain and lagoon.

Consulting Engineers: Northland Engineering, North Bay

Expected Completion Date: January, 1964

Estimated Project Cost: \$78,000.00

Difficult ground conditions at the site of the pumping station caused considerable delay and although the station was put into operation on December 26th a leak was observed in the forcemain thus preventing the system being put into operation at that time.

Preston (59-S-46)

Description of Project: Water pollution control plant
Consulting Engineers: Proctor & Redfern, Toronto
Completed: February
Estimated Project Cost: \$700,741.50

This contract included the construction of inlet works, two primary clarifiers, pumping station, aeration tanks, filter building and administration building, two secondary clarifiers, sludge holding tank and chlorine contact chamber. Testing of equipment took place in January and the plant went into full operation in February.

Richmond Hill (62-W-102)

Description of Project: Contract 1 - Drilling and development of #5 deep well. Supply and installation of deep well pump. Final contract cost - \$31,675.00
Contract 2 - Installation of raw water mains from well #5 site to Markham Road. Final contract cost - \$29,941.41
Contract 3 - Construction of pump-house for deep well #5 and electrical control. Est. contract cost - \$16,222.50
Completed: Contracts 1 & 2 - August
Contract 3 - December
Estimated Project Cost: \$75,934.00
Consulting Engineers: Proctor & Redfern, Toronto

The drilling and development of the deep well was carried out in the spring.

The installation of the raw water main from the well site to the connecting pipe at Markham Road and Norfolk was started on July 2nd and proceeded without difficulty along Norfolk Avenue,

Palmer Avenue, Conestoga Avenue, Paliser Crescent South and Roney Avenue to the well site.

The construction of the pumphouse was started on Sept. 24th. After completion of the structure, pump, stand-by gasoline engine and controls were installed and the equipment tested on November 26th. Some minor deficiencies were corrected and the pump station was taken into operation about the middle of December.

St. Catharines (62-S-126)

Description of Project: Sanitary intercepting sewer
Consulting Engineers: Proctor & Redfern, Toronto
Completed: September
Estimated Project Cost: \$563,000.00

The intercepting sewer was a part of the project which joined the City of St. Catharines, Town of Thorold and Township of Thorold.

Ground conditions were favorable and a satisfactory sewer installation was achieved.

Twp. of Saltfleet (62-S-128)

Description of Project: Contract 1 - Blenheim trunk sanitary sewer.
Final contract cost - \$237,436.27
Contract 2 - 66" dia. sanitary trunk sewer in tunnel.
Est. contract cost - \$248,000.00

Consulting Engineer: William L. Sears, Township Engineer
Completed: Contract 1 - September 13.
Expected Completion Date: Contract 2 - June, 1964
Estimated Project Cost: \$539,908.58

Construction work started on January 23rd and progressed without major difficulties except for some delay due to late approval of easements. Hard shale rock was encountered during construction work. The sewers were tested and flushed. The contract was completed on September 13th.

The trunk sewer system covered by this contract was not taken into operation pending completion of the 66" dia. trunk sanitary sewer being constructed under Contract 2.

The work on the 66" dia. sanitary trunk sewer in tunnel started on September 3rd and was 58.6% complete by the end of the year. During construction work soil tests taken periodically indicated the presence of sulphates in the trench in excess of 150 p.p.m. This made it necessary to change from cement #1 to cement #5 which was resistant to attack of sulphates in the soil. The construction cost would be raised slightly by this change of material.

Sault Ste. Marie (61-W-86)

Description of Project:	Contract 1 - Construction of a six-million gallon storage reservoir and a booster pumping station to improve the supply in a low pressure area.
	Est.contract cost - \$557,513.14
	Contract 2 - Construction of 12,000 lin.ft. of 30" watermain from existing pumping station to reservoir.
	Contract 3 - Construction of 8,000 lin.ft. of 18", 16" and 12" watermain from the booster pumping station to serve an area of low pressure.
	Est.contract cost - \$156,000.00
Consulting Engineers:	Proctor & Redfern, Toronto
Completed:	June
Estimated Project Cost:	\$1,403,000.00

Contract 1 - The reservoir was ready for testing in January, but owing to a delay in the completion of the watermain there was no water available for testing. Following testing, backfilling was started after the spring break-up but the reservoir was in service in April and the pumps went into operation in May.

Contract 2 - Cleaning, testing and chlorinating were completed by the end of January.

Contract 3 - Work commenced in January and proceeded throughout the winter. The main was put into service in June but the contractor was slow in attending to minor deficiencies.

Seaforth (60-S-60)

Description of Project: Extension to existing sanitary sewers including a prefabricated pumping station and a two-cell lagoon.

Consulting Engineers: James F. MacLaren Ltd., Toronto

Completed: October 14

Estimated Project Cost: \$224,555.00

The general contractor was most co-operative and completed all his contract requirements including clean-up items.

Twp. of Sidney (Batawa) (62-S-121)

Description of Project: Contract 1 - Outfall sewer
Est.contract cost -
\$33,952.50

Contract 2 - Water pollution control plant.
Est.contract cost -
\$116,403.60

Consulting Engineers: Gore & Storrie Ltd., Toronto

Completed: Contract 1 - August 15
Contract 2 - December

Estimated Project Cost: \$175,373.92

Work on Contract 1 commenced May 9th, and was completed as specified.

Construction of Contract 2 commenced May 16th and was completed by December 16th, also on schedule.

Simcoe (62-S-120)

Description of Project: Contract 1 - Water pollution control plant extension.
Est.contract cost -
\$613,000.00

Contract 2 - Trunk sewer
Est.contract cost -
\$99,000.00

Consulting Engineers: Proctor & Redfern, Toronto

Completed: October

Estimated Project Cost: \$769,000.00

Both contracts were satisfactorily completed and no difficulties were encountered.

Smithville (61-S-80)

Description of Project: Sanitary sewer with service connections, sewage pumping station and one-cell lagoon

Consulting Engineers: Douglas G. Ure & Sons, St.Catharines

Completed: December

Estimated Project Cost: \$321,178.00

Construction work started in January, with the installation of sanitary sewers and the forcemain. The necessary earthwork for the construction of the one lagoon cell was started in spring after the ground was sufficiently dried. The prefabricated underground sewage pumping station was installed in July. The latter gave trouble due to installation of a pump, the type of which was not acceptable to the Commission and required exchanging. In addition, the fuel tank, ladder and cover required revisions.

During the installation of the sanitary sewers and forcemains, an extraordinarily large amount of rock was encountered in the trenches. This condition slowed down the work and raised the contract price considerably.

Sudbury (62-S-111)

Description of Project: Shaft No. 1 and underground pumping station.

Consulting Engineers: Dillon & Lewis Ltd., Sudbury

Completed: August

Estimated Project Cost: \$777,000.00

This was a very difficult project but was completed to the entire satisfaction of the municipality. The rock excavation, placing of concrete and installation of heavy equipment was well handled by the contractor.

Sutton (62-S-122)

Description of Project: Sewers, pumping stations, forcemains and a lagoon.

Consulting Engineers: R. K. Kilborn & Associates, Toronto

Completed: December

Estimated Project Cost: \$275,000.00

Work began in the spring and was delayed for several weeks during summer to avoid disrupting tourist traffic. The system was ready to go into operation in December.



Twp. of Tarentorus (62-S-134)

Description of Project: Approximately 12,000 feet of trunk sewer.

Consulting Engineers: Proctor & Redfern, Toronto

Expected Completion Date: February, 1964

Estimated Project Cost: \$224,699.00

Work commenced in February but was suspended for four weeks in April due to the spring run-off. Pipe-laying conditions were difficult throughout. In the fall it was agreed that the eastern section of the sewer should be deleted from the contract thereby reducing the cost by approximately \$70,000.00. All but 350 feet of the remainder was laid by September but cleaning and testing of

the sewer already laid had not been completed by the year's end.

Tavistock (61-S-85)

Description of Project: Sanitary sewers, two pumping stations, forcemains and lagoons.

Consulting Engineer: R. M. Dawson, Stratford

Completed: August

Estimated Project Cost: \$359,500.00

Construction was suspended during the months of January, February and March. The sewers and forcemains were all laid and the lagoons were ready for operation in July but testing delayed initial operation until August.

Thorold (63-S-147)

Description of Project: Sanitary trunk sewer

Consulting Engineers: James F. MacLaren Ltd., Toronto

Expected Completion Date: July, 1964

Estimated Project Cost: \$190,000.00

Work commenced December 10th and progress was satisfactory during the short period remaining before the year-end.

Timmins (60-S-71)

Description of Project: Contract 1 - Outfall sewer
Est.contract cost -
\$107,752.28

Contract 2 - Water pollution control plant.
Est.contract cost -
\$609,000.00

Consulting Engineers: Gore & Storrie Ltd., Toronto

Expected Completion Date: Contract 1 - Completed February 23rd
Contract 2 - January, 1964

Estimated Project Cost: \$810,000.00

Contract 1 was completed during the last 10 weeks of 1962 despite inclement weather, and testing and repair work were finished in February. Surface restoration was completed in the spring.

Work under Contract 2 was carried on through the winter and

owing to delays for various reasons was not expected to be put into operation until early 1964, some 12 weeks behind schedule.

Twp. of Toronto (63-S-138)

Description of Project: Stage I of the Cooksville Creek sanitary trunk sewer.

Consulting Engineer: Township Engineer

Completed: November

Estimated Project Cost: \$230,000.00

The order to commence work was given to the contractor, March 22nd. Progress was slow owing to the rock encountered being harder than had been expected and by extra care being required when blasting owing to the proximity of houses and existing services. Although the sewer and manhole installation was completed in August the contractor was slow in completing restoration work and the correction of leaks. Eventually the work was satisfactory completed in November.

Twp. of Toronto (62-W-97)

Description of Project: 66" dia. water intake in Lake Ontario

Consulting Engineers: Gore & Storrie Ltd., Toronto

Completed: July

Estimated Project Cost: \$407,500.00

The contractor resumed work at the beginning of May and had the works substantially completed by July 9th. This intake extended about 3,000 lin. ft. into the lake and was urgently required, to replace the inadequate existing intake.

Twp. of Toronto (63-S-145)

Description of Project: Stage II of the Cooksville Creek sanitary trunk sewer.

Contract 1 - From Queen Elizabeth Way to King St.
Est.contract cost - \$217,000.00

Contract 2 - From King St. to the C.P.R.
Est.contract cost - \$145,000.00

Consulting Engineer: Township Engineer

Expected Completion Date: Contract 1 - July, 1964

Contract 2 - Not yet known.

Estimated Project Cost: \$557,000.00

Work on Contract 1 was started in November at the south end of the sewer and a second crew began work in December at a point upstream. Progress was slow at the southern end of the contract due to difficult excavation in hard ground.

Tenders for Contract 2 had not yet been called by the year-end as the township requested a delay.

Waterford (62-S-119)

Description of Project: Contract 1 - Sewers and lift station
Est.contract cost -
\$206,000.00

Contract 2 - Lagoon
Est.contract cost -
\$51,000.00

Consulting Engineers: Proctor & Redfern, Toronto

Completed: October

Estimated Project Cost: \$278,000.00

The sewage system was satisfactorily completed. Some road restoration was not finished and was to be attended to in the spring of 1964.

Construction of the lagoon was completed without any unforeseen difficulties.

Wellington (60-W-60)

Description of Project: Installation of two pumphouses, watermains and an elevated steel water storage tank.

Consulting Engineers: Gore & Storrie Ltd., Toronto

Completed: August 9th

Estimated Project Cost: \$273,711.00

The general contractor performed a satisfactory job and fulfilled contract obligations.

Twp. of Whitchurch (63-W-118)

Description of Project: Watermains, valve chamber, meter chamber.

Consulting Engineers: Crysler, Davis & Jorgensen Ltd., Willowdale, Ont.

Estimated Project Cost: \$142,000.00

The tender advertisement was published in December and tenders were due to be opened in January, 1964.

Twp. of Widdifield (62-S-103) (2)

Description of Project: Trunk sanitary sewer, pumping station and forcemain.

Consulting Engineers: Northland Engineering, North Bay

Completed: March 7th

Estimated Project Cost including Contract 2 completed in 1963 - \$234,000.00

The works were put into operation in the fall of 1962 but a bad leak under Ontario Northland Railroad tracks proved difficult to patch and was not stopped until March.

Wingham (62-S-129 & 63-S-139)

Description of Project: Storm sewers
Trunk sanitary sewers, prefabricated pumping station, forcemain, lagoon, outfall.

Consulting Engineers: B. M. Ross, Goderich

Expected Completion Date: September 2, 1964

Estimated Project Cost: \$341,600.00

Contract work started October 1st. At the end of the year the construction of sewers, manholes and forcemains was slightly ahead of schedule at about 50 per cent while the oxidation ponds were only about eight per cent finished and were somewhat behind schedule due to wet ground conditions.

Division of Laboratories

F.A. Voege, Director
R.H. Millest, Assistant Director

Staff situation in the Division of Laboratories at the end of 1963 was excellent in that complement was only one under the number provided for in the 1963-64 estimates. This came about despite the fact there were 18 terminations of employment during the year for various reasons, including the transfer of four to the new Division of Research.



With the appointment of A.J. Harris during the year to the position of Director of the Division of Research, it became necessary to name a new Assistant Director of the Division of Laboratories, a post formerly held by Mr. Harris. Appointed to this position was R.H. Millest who also assumed the post of Supervisor, Industrial Wastes Branch. He and Mr. Harris formerly were co-supervisors of that branch of the Division of Laboratories.

In the analytical work conducted by the various branches, the expected and/or predicted increase in samples to be processed did

not materialize. Total samples processed and the determinations made, compared with the 1962 figures, follow:

<u>Branch</u>	<u>No. of Samples</u>		<u>No. of Determinations</u>	
	<u>1962</u>	<u>1963</u>	<u>1962</u>	<u>1963</u>
Bacteriology	19,280	20,385	28,206	40,259
Biology	596	522	991	1,217
Chemistry	26,109	26,187	119,841	118,809
Purification Processes	No record	8,503	No record	21,395
Totals	<u>45,985</u>	<u>55,597</u>	<u>149,038</u>	<u>181,680</u>

The increase shown was due partly to the inclusion in the over-all division total of Purification Processes Branch samples for the first time. Although there was no actual means of comparison for this branch, a definite increase over 1962 was indicated due to the large amount of analytical work necessary in investigations made at water pollution control plants in the field.

Staff of the division gave 14 lectures to the operators attending the water works and sewage works operators' courses sponsored by the Commission. Laboratory demonstrations also were provided for these courses. The Biology Branch conducted two one-week courses on algae identification and enumeration for water works operators.

The number of summer students employed in 1963 decreased from the two previous years, dropping to 20 from 32 in 1961 and 29 in 1962. By arranging the permanent personnel acquisitions, more work was accomplished, despite the use of fewer students since the permanent employees were available to process the early spring and late fall loads which occurred before the students arrived and after they returned to school.

Tours of the laboratory building and the discussions before, during and after the tours provided a means of publicizing the work of the Commission and the need for pollution control and water resources management. During 1963, tours were conducted by the division staff for such groups as employees of the Meteor-

logical Branch of the federal Department of Transport, a group of students from McMaster University, a 4H Club, public health course students from Camp Borden, a Boy Scout group, members of the Waterloo County Council, students from the University of Waterloo, doctors taking the Diploma of Public Health course at the School of Hygiene, University of Toronto, and graduates taking the Resources Management course at the University of Toronto.

To furnish room for the Division of Research and to improve the working efficiency of the various branches of the Division of Laboratories, office space in the laboratories building was rearranged and re-allocated. Personnel of the various branches were brought together as much as possible, instead of being scattered around the building as was the case previously. This improved divisional and branch communications, filing and the overall efficiency of the staff.

BACTERIOLOGICAL BRANCH

The problems associated with the detection and interpretation of bacterial pollution in water have required more intensive analytical investigations into the samples submitted. The reason for this was that the field staff requested more information per sample and the public submitted a greater number of samples than ever before. New analytical techniques were developed to meet these demands, statistical methods were introduced to evaluate an intensive survey of the mouth of the Niagara River, the Commission worked towards adopting bacteriological drinking water objectives, a greater number of samples were analyzed and more determinations were performed. In the laboratory, investigations into new bacterial parameters to determine levels and the origin of pollutants were intensified.

Samples falling into the nuisance organism category numbered 241 during 1963. This group of samples required mainly microscopic examinations and bacterial plate counts, but other non-routine examinations to identify the sources of tastes, odors, staining and bio-fouling in drinking water systems, bulking in activated sludge plants and slime formation in surface waters also were conducted.

For some time the Township of Markham water supply had been plagued by iron slime problems which reached a peak in late summer and autumn of 1963. At this point an extensive survey of the history of the system was combined with a concentrated sampling program to obtain a complete picture of the situation. From this

it was possible to determine that iron bacteria were a major contributor to the problem, and to recommend treatment procedures for their control.

The New Liskeard water supply also was found to have a history of taste, odor and iron staining troubles. In addition, plugging of individual services was reported. Treatment with a water conditioner proved to be effective in freeing the plugged services, though the taste and odor problem persisted. The presence of iron bacteria was found to be part of the problem and recommendations for their control were made.

An investigation of the effect of a commercial water conditioner (a-hexametaphosphate) on the bacterial flora of a troublesome water was prompted by the fact that the situation was aggravated following its use. In a rough experiment, it was concluded that over a period of time the presence of this compound could support and increase the total population in the water. Subsequently, the taste and odor problem would become worse following the breakdown of these microbial cells.

A taste and odor problem at the Britannia Water Filtration Plant in Ottawa initiated a yet-to-be-completed investigation of the malodorous compound released into waters by actinomycetes. Compounds in water passing through the plant were concentrated by a carbon adsorption unit and isolated to compare with compounds from mass cultures of these organisms. The actinomycetes used in this study have been obtained from both the original source of the problem and from other surface water sources from which plates have been prepared in a lengthy isolation and identification program. The Spectroscopy section of the Chemical Branch was co-operating on this project.

The efficiency of removal of bacteria by a diatomaceous earth filter from a moderately polluted surface water was also under study in conjunction with work being carried out by the Purification Processes Branch. This work was not expected to be completed for some time and was being continued in its preliminary phase in a program intended to investigate the quality of water produced by the small cartridge filters in use in small private water systems.

Two unusual problems concerning sewage treatment were investigated. The first was a bulking problem in a City of Toronto pilot plant caused by an unusual non-filamentous organism. Analyses of these samples were lengthy and it was found that the

organisms growing were as a result of the highly nutritive effluent. Longer retention periods in this total oxidation experimental system were recommended to alleviate this problem. Methods to study water pollution control plant problems such as this one were developed to allow for an ultimately faster resolution of similar situations.

A sample of lagoon liquor from a dead-stock removal plant was found to contain a large population of red photosynthetic sulphur bacteria. These had been present in sufficient quantities to color the entire lagoon reddish-purple. The complete significance of the presence of these organisms was not known, but their presence was believed to be an indication of complete anaerobic conditions in the lagoon.

As a result of an unusually high number of requests for information on drinking water standards for livestock, a survey of the literature and of the institutions dealing with livestock was made. It became obvious that no bacterial standards or objectives were used by any agency in Ontario, or, as far as was known, in the United States and Great Britain. It also was evident that this area had not been considered in any detail and suitable information was sparse. The rule of thumb adopted by the California State Board of Health was that for the most efficient production of livestock, water quality similar to that required by humans was suitable.

As part of the adoption of OWRC Drinking Water Objectives, the bacteriological section was prepared by this branch. Standards set up by a number of agencies throughout the world including the World Health Organization International Standards, the European Standards, the United States Public Health Standards, and the British Ministry Standards, were carefully studied. In order to make these objectives as realistic as possible and suitable for the Province of Ontario, sampling practices followed in the Metropolitan Toronto water treatment plants and the laboratory techniques used in the Ontario Department of Health laboratories were carefully considered. The bacteriological section was reviewed on a number of occasions through the year and suitable changes were made with a final copy prepared and ready for presentation to the committee by the end of the summer. The bacteriological section was patterned after the World Health Organization International Drinking Water Standards, since these were considered to be the most comprehensive, reflecting the current concepts in bacterial parameters.

In an attempt to fill the need for a depth sampling device capable of obtaining a suitable bacteriological sample, a thorough investigation of the literature was made and several designs of equipment used in oceanographic institutes in the United States were collected. Though most of these were found unsuitable, the information obtained helped to solve the problems encountered. A new sampler was designed by this branch and found to be satisfactory for obtaining bacteriologically sterile samples at depths up to 30 feet. This device was ready for the field staff use at the end of March.

A report regarding the optimum temperature for primary isolation of coliform bacteria was prepared based on a survey of recent literature and personal communications with Professor Gilcreas of the American Public Health Association. This laboratory was using a 37° C incubation similar to the Ontario Department of Health though American public health laboratories had changed to 35° C. Following a review of this report the director in March assented to a change of coliform incubation temperatures from 37° C to 35° C.

Samples of water taken from the Humber River during the months of February, March and the beginning of April were subjected to detailed bacterial analyses in order to assess the productivity of some of the isolation broths. At the conclusion of this study, sufficient evidence was indicated that the techniques and broths then in use were equally productive. This work provided the opportunity to introduce to the technicians a number of newer bacteriological techniques.

Information was obtained about the frequency distribution of coliform types at 35° C and 44° C which provided a measure of estimating the relative amount of fecal pollution present.

The International Joint Commission's sampling program of the Niagara River at a range one mile from the mouth (Ni-1.0) was begun in May. The sampling and analytical program was carried out in conjunction with the Buffalo, N.Y. laboratory of the United States Public Health Service. Twelve surveys were carried out between May and November.

In July, a trip to Buffalo was made to attend an I.J.C. meeting of the Buffalo and OWRC laboratories. A standardized procedure for sampling and analysis of the Niagara River, Range Ni-1.0, was drawn up with the assistance of H.F. Clark of the R.A. Taft

Sanitary Engineering Centre in Cincinnati. For comparative purposes, analyses were to be made on "split" samples to permit a laboratory check to be done on analytical techniques of the Buffalo and OWRC laboratories. Lack of a standardized procedure could well account for the differences in results from the two laboratories in the past.

The U.S. laboratory did the majority of the chemical analyses, while the OWRC laboratory concentrated on the bacteriological quality of the water, determining the total coliform, fecal coliform and streptococcal populations. The information from this survey also would be useful in the development of a suitable membrane filter technique for the differentiation of fecal coliforms.

The data which were accumulated from 10 of the above surveys were subjected to a detailed statistical analysis. Conclusions and interpretation of the Niagara River Survey work were to be presented in a report to the I.J.C. committee in February, 1964.

A paper entitled "Problems With And Control Of Iron Bacteria In Water Works Systems" was presented at the Canadian Section of the American Water Works Association Conference held in Quebec City in April. The problems that this group of organisms have caused as a result of their presence in water treatment plants, wells, reservoirs, distribution systems, and in the receiving industries and domiciles, were detailed, and a brief history of the calamities caused by this varied group of bacteria was given. The nature of these organisms, with specific reference to their classification in biology, their distribution in nature and their chemistry, was discussed. A large section on identification features and problems in identification with reference to the main groups of iron bacteria was also prepared. A statement was made regarding the conditions favoring the growth of iron bacteria and a discussion regarding the means available to a water work's operator to control these organisms was presented.

Representations were made in an effort to obtain laboratory space to conduct the non-routine work. During the year 40 per cent of the determinations represented non-routine work. During the nine months of the year in which most of this work was conducted, the space available in the production laboratory was very confining. Though it was not possible to arrange for funds to carry out this expansion in 1963, it was important that approval in principle was granted.

Two activities under the jurisdiction of the branch performed

work for all branches of the division. These were glassworking and glassware washing services. More than 173,000 pieces of glassware were handled, 48,000 of which were sample bottles and the remainder, laboratory glassware. Over 140 pieces of glassware were repaired or constructed. Sixty of these were major items which ordinarily would have required replacement or would have been sent out for repairs.

The activities of the branch, which could be partially expressed by numbers of samples and determinations, are summarized below to indicate principally the routine workload of the year 1963. Numbers of determinations are a better index of workload since several may have been conducted on one sample. The time required to perform each analysis varied greatly and could be taken into consideration by these figures.

Table 1

COMPARISON OF SAMPLES ANALYZED IN 1962 and 1963

	<u>1962</u>	<u>1963</u>	<u>Percentage</u>
Total Samples	19,280	20,385	+ 5.73%
Water Samples	10,926	12,322	+12.77%
River Samples	4,191	4,757	13.26%
Sewage Samples	3,909	3,065	(-21.59%)
Other Samples	254	241	(- 5.11%)
OWRC Collected Samples	10,439	9,708	(- 7.00%)
Non-OWRC Collected Samples	8,841	10,677	+ 20.76%
Determinations	28,206	40,259	+ 42.73%

Table 1 shows an increase of 1,105 samples and 12,053 determinations over the 1962 figures. These increases occurred mainly in water (by 1,396) and river (556) sample submissions. The 12,053 increase in determinations over 1962 indicated that a greater amount of information was produced per sample with several new analytical methods introduced. The 1962 increase in numbers

of determinations over 1961 was 7,709. Sixteen new determinations were introduced in 1963 and were mainly for laboratory use.

Table II

PERCENT DISTRIBUTION OF SAMPLE SUBMISSIONS 1962 and 1963

	<u>1962*</u>	<u>1963*</u>
Public	42.3%	52.4%
San. Eng.	37.5%	34.1%
Plant Op.	11.8%	9.1%
Laboratory	7.4%	4.0%
Water Resources	1.0%	0.3%
Construction	----	0.1%

*1962 figures were calculated on a count of three representative months. 1963 figures were an actual count.

Table III

<u>DETERMINATIONS</u>	<u>1962</u>	<u>Percentage of Total</u>	<u>1963</u>	<u>Percentage of Total</u>
Membrane Filter Coliform	(20,031)	71.0%	(21,188)	52.6%
Most Probable Number Coliform	(533)	1.9%	(531)	1.3%
Fecal Coliform	(508)	1.8%	(322)	0.8%
Indicated Number of Coliforms	(25)	0.1%	(---)	----
Slides	(427)	1.5%	(239)	0.6%
Plates	(1,465)	5.2%	(1,951)	4.9%
Non-routine Analyses	(5,217)	18.5%	(16,028)	39.8%
TOTALS	(28,206)	100%	(40,259)	100%

Table III shows the shift of emphasis from requests for routine analyses (Membrane Filter coliform) in 1962, to more specialized work as indicated by the "non-routine" determinations in 1963. More information requested per sample initiated this increase. The crude Indicated Number procedure has been replaced completely by the more accurate Membrane Filter method.

Fifty-two percent of the 1963 samples came from non-OWRC sources. All of the OWRC divisions normally collecting samples submitted a lower percentage of the total number of samples than in 1962.

Table IV

DISTRIBUTION OF NON-OWRC SUBMITTED SAMPLES
52.4% of TOTAL SAMPLES

<u>AGENCY</u>	<u>1962*</u>	<u>1963**</u>	
	<u>Percent</u>	<u>Percent (Actual No.)</u>	
Water and Water Pollution Control Plants	39.2	28.6 (3,021)	
Armed Forces	6.0	4.7 (499)	
Dept. of Highways and)		1.0 (104))	
Ontario Hydro)	17.0	0.1 (14))	24.7%
Ontario Hospitals)		0.7 (68))	
Others)		22.9 (2,414))	
Dept. of Lands and)))
Forests and)	14.2)	8.3 (878))	
Conservation Agencies)))
) 37.8%) 42.0%
Public Utilities	13.2)	19.5 (2,062))	
Commissions))
))
Medical Officers of	10.4)	14.2 (1,494))	
Health))

* 1962 figures are based on an estimation of three representative months.

** 1963 figures are an actual count.

Table IV gives a breakdown of the 1963 "non-OWRC-collected" samples compared to 1962. Water treatment and water pollution control plants submitted fewer samples in 1963 than in 1962 though Public Utilities Commissions and Medical Officers of Health samples increased. The Department of Lands and Forests stream and well water sampling program was reduced. Samples from individual house and cottage owners increased substantially. This activity could be attributed to the ever-increasing awareness of the people of Ontario of the OWRC services.

The groups of bacteria falling into the nuisance organism category included those capable of creating problems in both water and sewage systems and in streams, but were not directly of public health concern. These represented members of the iron bacteria, sulphate reducing bacteria, actinomycetes and total microbial population in water systems, and bulking organisms such as Sphaerotilus natans causing bulking in sewage systems and slimes in streams.

During 1963, the total number of submissions requiring these examinations was 241. This was slightly fewer than in 1962 when 254 were submitted.

Table V gives a breakdown of the determinations performed on these samples.

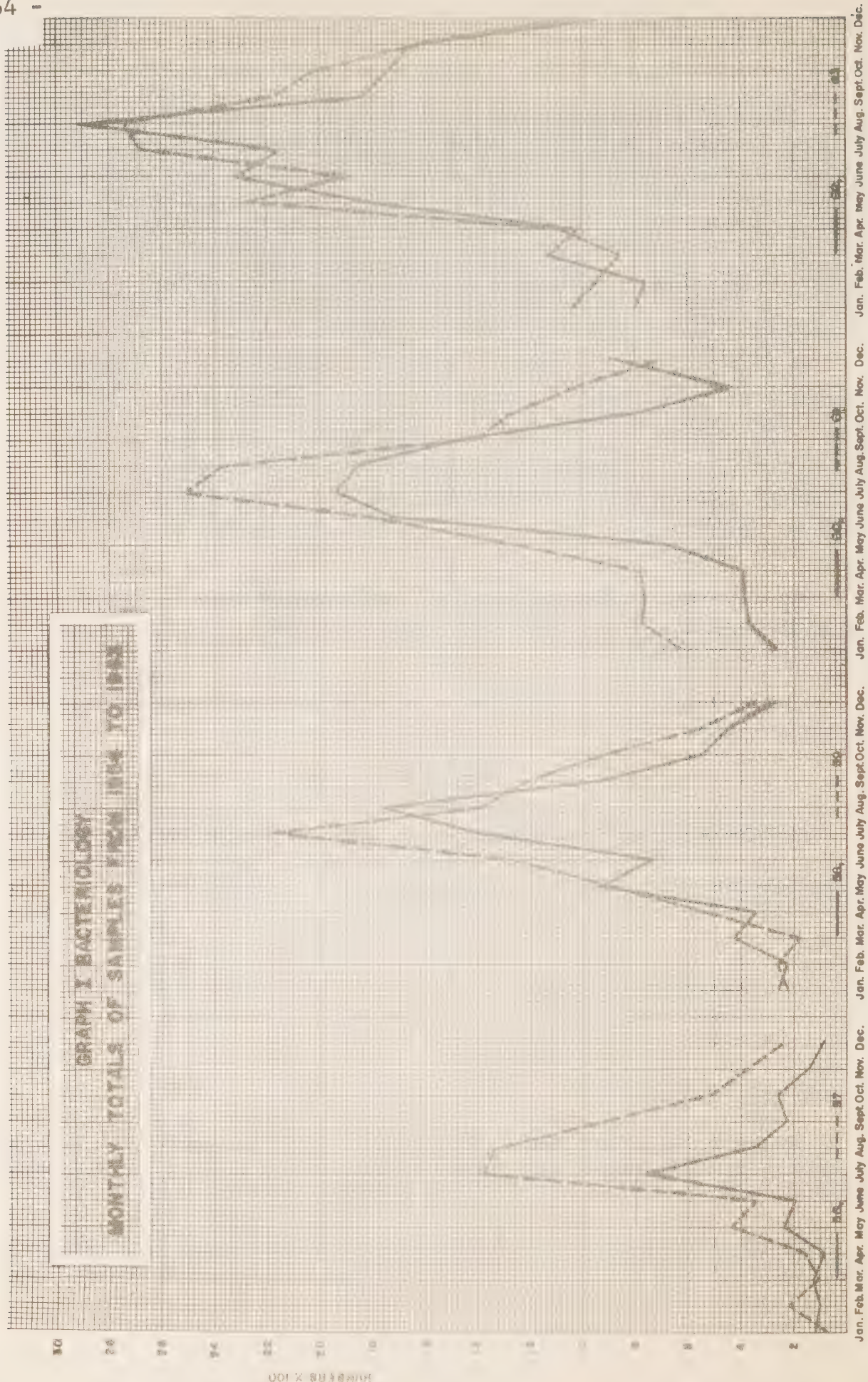
Table V

DETERMINATIONS PERFORMED ON NUISANCE ORGANISM SAMPLES

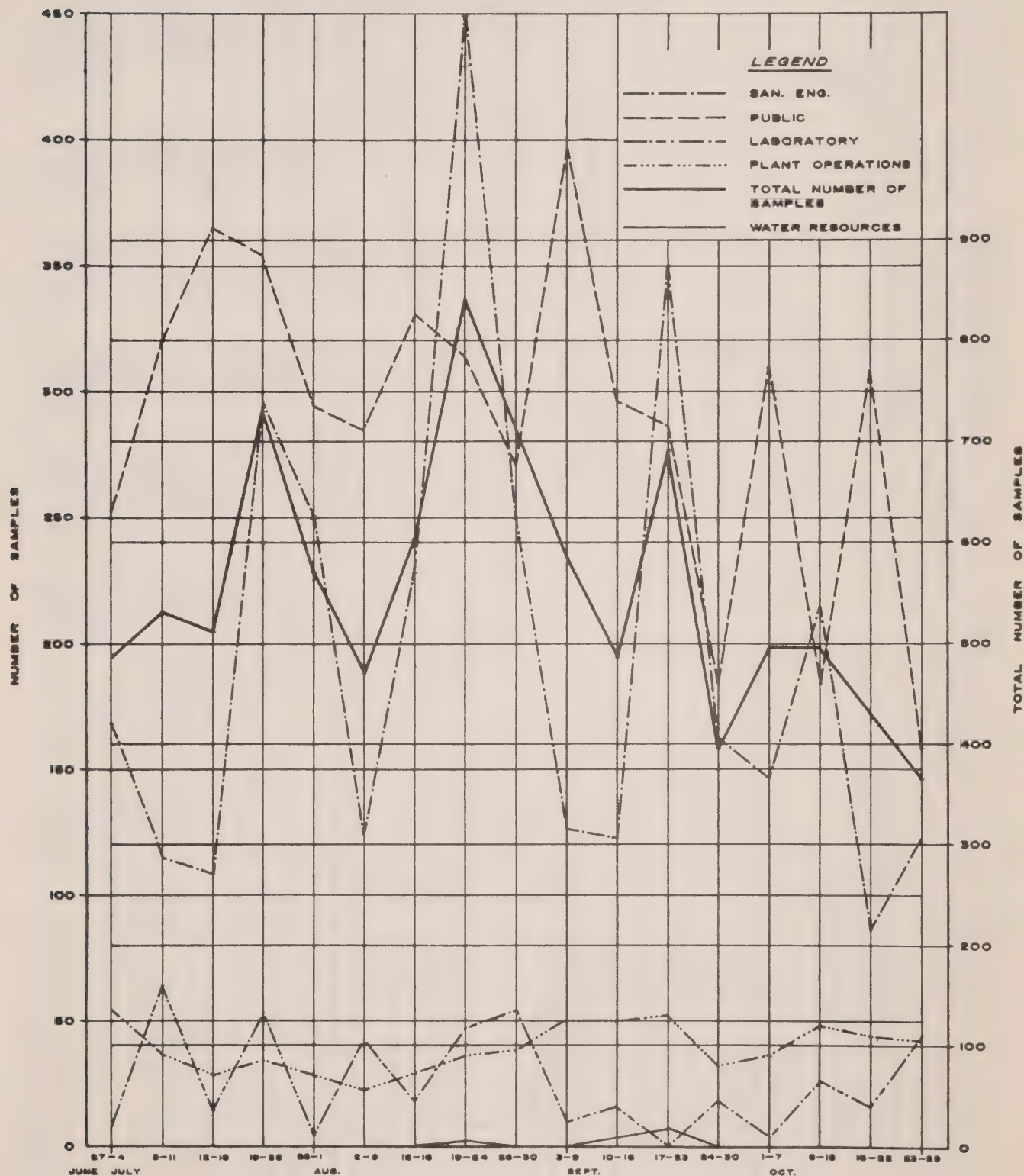
<u>MICROORGANISM INVOLVED</u>	<u>NUMBER</u>	<u>PERCENTAGE</u>
Iron bacteria	184	67.4
Sulphate reducing bacteria	58	21.2
Total Aerobic Population	22	8.0
<u>S. natans and others</u>	9	3.7

Graph I indicates the trend established in 1960, of increased activity in the spring and fall months of the year. Winter sample submissions also increased but to a lesser extent.

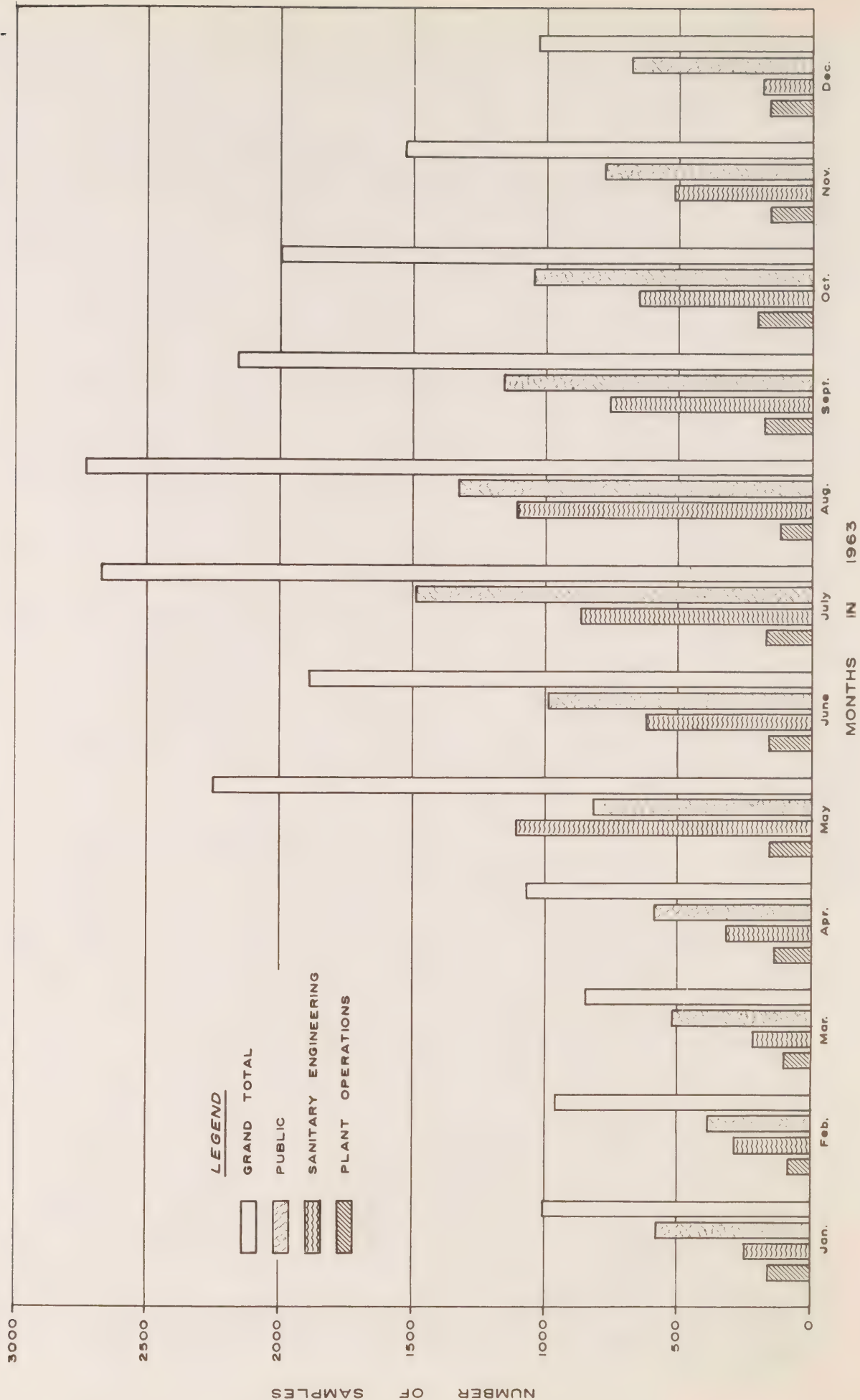
Graph II represents a five working days' total of samples submitted by the OWRC Divisions and the public. This graph was



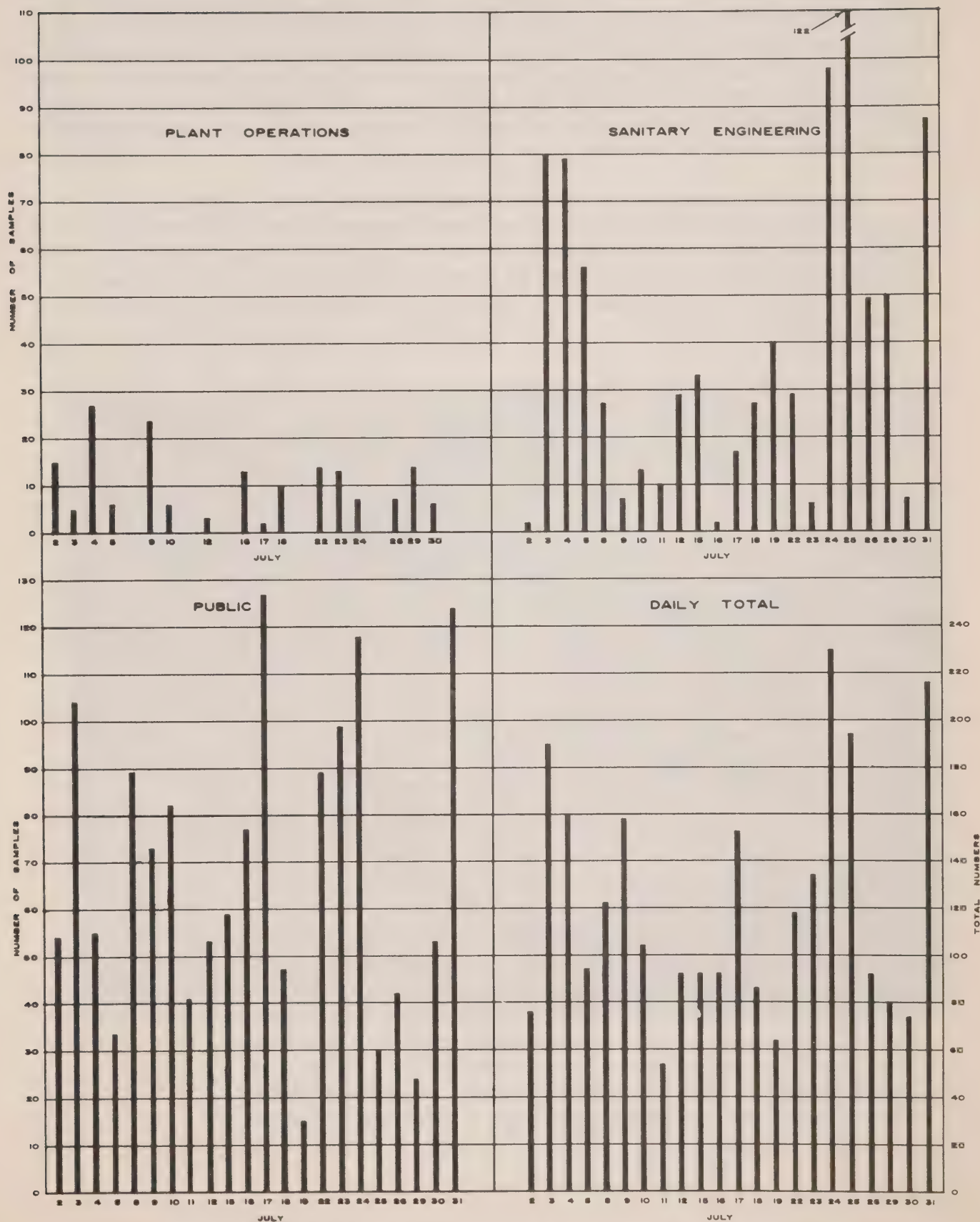
GRAPH II - BACTERIOLOGY
FIVE WORKING DAY FREQUENCY DISTRIBUTION OF SAMPLES
RECEIVED JUNE 27 - OCT. 29, 1963



GRAPH III - BACTERIOLOGY
MONTHLY NUMBERS OF SAMPLES - 1963



GRAPH IV - BACTERIOLOGY
FREQUENCY DISTRIBUTION OF DAILY SAMPLES IN JULY 1963



included to show the variability of the total sample workload in the branch and to indicate the extent and constant nature of this variance. The two main sources of samples, the public and the Division of Sanitary Engineering could submit large quantities of samples one week and only a few another. Planning budget to handle this variable load at times was difficult. The Division of Plant Operations' samples varied little by comparison.

Graph III represents monthly total numbers of samples received from the divisions of Sanitary Engineering and Plant Operations and the public, together with the monthly totals. By comparison to Graph II, Graph III seems to indicate a well modulated flow of samples and so Graph IV was included to again show the daily fluctuations in flow of samples.



BIOLOGY BRANCH

In 1963 the Biology Branch carried out a number of field and laboratory studies, administered a permit system controlling the use of chemicals in public water, carried out an algae research study, gave a number of scientific papers and courses of instruction and provided a routine laboratory service for biological analyses.

There were a number of important and interesting studies relating to both water supply and pollution control. In the Elliot Lake area a series of samples of representative forms of life were taken from certain lakes to determine whether there was any evidence of increased radioactivity resulting from the disposal of mining wastes in the Serpent River watershed. Analyses of the samples collected were being completed by the Ontario Department of Health as the year ended. The final report of biological conditions in the Rainy River was completed. This was a co-operative study carried out under the auspices of the International Joint Commission over a period of three years. The effects of paper mill waste on life in the river were described in this report.

A number of investigations were made of municipal water supplies where algae caused adverse taste and odor conditions or filtration problems and recommendations were made to alleviate these difficulties.

An investigation of unpalatable flavors in fish was made by the branch for the first time. Staff members were selected to form a taste panel which was presented with unidentified samples of fish, flavor of which was suspected of being affected by industrial wastes. A statistical analysis was made of the results which clearly demonstrated the presence of obnoxious flavors and related these to the flavor of the suspected waste.

The branch continued the work associated with the use of pesticides in water, reviewing applications for permits to apply chemicals to public waters and providing advice and technical information upon request. Regulations were passed in 1963 which exempted persons applying substances to private ponds having no outflow, and individuals applying approved substances to drainage ditches for control of emergent vegetation. As a result of these regulations, and because one previously active commercial applicator was no longer in business, total permits issued dropped from 135 to 59. There was, however, a growing interest on the part of

the public and the number of permits issued to individuals doubled as compared to the previous year. In connection with aquatic plant algae control, a booklet was prepared for free distribution to persons requesting information. As evidence of the widespread interest in controlling aquatic vegetation, close to 2,000 of these were distributed, mostly on individual request. Other activities related to the use of pesticides included preparation of an OWRC publication resulting from laboratory and field studies of toxicity, and taste and odor production by herbicidal chemicals; a Commission-sponsored conference for all persons interested in the use of aquatic pesticidal products; follow-up studies on the effectiveness of certain lake treatments and the development of a reference collection of aquatic plants.



Another major undertaking of the Biology Branch was the study of the causes of excessive growths of the algae *Cladophora* and methods for its control. This Branch provided the staff and direction for this program, but it was financed as a project of the Division of Research. Details of the findings of this study are reported in the summary of the activities of that division.

The quality of water is reflected by the number and species of algae which inhabit it. For this reason it became important that comprehensive information on algae populations be accumulated

so that any changes could be measured. The enumeration of algae in samples from as many sources as were necessary was impossible because of staff limitations. The same information, however, was important to the operation of water treatment plants, but because of the technical nature of the subject few operators had been able to do algae counts. The Biology Branch, therefore, prepared a detailed manual on algae identification and enumeration and provided two courses of instruction for water works' operators. Municipalities having personnel undertaking regular counts were requested to make the results available to the Commission and information began coming in regularly for many of Ontario's waterways. Further courses were planned.

Fish kills in Ontario are investigated by various divisions of the Commission and by the Department of Lands and Forests, but no records were available of the number of kills or the causes. As it was important that this information be available, a standard procedure was set up to accomplish this. Records for the first year, not necessarily complete:

<u>Cause - (known or suspected)</u>	<u>No. of Kills</u>
Pesticides	7
Industrial Wastes	6
Municipal Wastes*	4
Natural	1
Unknown	2
Total	<u>20</u>

* One combined municipal and industrial waste.

An important function of the branch was the presentation of scientific papers and lectures on the effects of pollution and problems relating to water supply. During the year 25 addresses were delivered.

Biological analyses and the identification of specimens also was an important part of the branch work, though not the major function. The number of samples received was down from 596 in 1962 to 522 in 1963, chiefly as a result of the completion of the International Joint Commission work on the Rainy River. At the

end of 1962, 112 preserved samples remained for analyses as compared with 59 at the end of 1963. The backlog of samples and a considerable increase in samples requiring time-consuming algae counts combined to increase the work load of routine analyses this year.

Summary of Samples Received (1963)

Algae Counts	282
Algae Identification	88
Benthos	59
Toxicity Bioassay	47
Other Examinations	<u>46</u>
Total	<u>522</u>

Sources of Samples Received

Biology Branch	94
Research Division	99
Plant Operations	95
Sanitary Engineering	61
Other OWRC	51
Other Agencies i.e. Municipal, Health Units	84
Public	<u>38</u>
Total	<u>522</u>

The staff of the Biology Branch consisted of four biologists and one technician. One biologist was employed in 1963 with the expectation of increasing studies on the effects of waste discharges on the biological quality of receiving waters. The expanded nature of the Cladophora project, however, required the full-time services of this biologist.



CHEMISTRY BRANCH

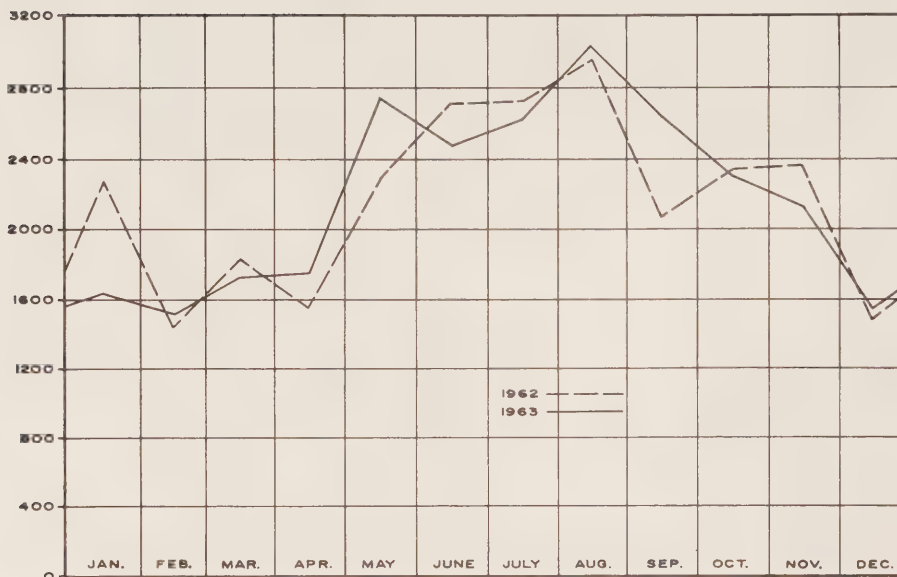
The Chemistry Branch continued to provide, to the field staffs of the OWRC and to other agencies, analytical services in respect to water quality and water pollution control. As illustrated in Graph I, an expected increase in sampling, particularly within the OWRC, did not materialize and the year ended with approximately the same numbers of samples processed as during 1962. As in previous years, samples peaked in the summer and also continued a trend toward higher levels of sampling during the spring and fall. Unfortunately the capacity of the laboratory could not be adjusted to exactly suit this input by employing casual student technicians since these were available during the summer months only.

In addition to routine sample analyses, and the provision of analytical consultation regarding large numbers of samples arising from efforts to solve specific field problems, some special analytical projects were noteworthy. Anionic detergent tests on samples of surface waters and drain discharges collected by the Division of Sanitary Engineering, and, beginning in November, on the raw and effluent samples from all OWRC-operated water pollution control

MONTHLY SAMPLE TOTALS

CHEMICAL LABORATORY

COMPARISON 1962 - 1963



MONTH	NUMBER OF SAMPLES RECEIVED	
	1962	1963
JANUARY	2281	1637
FEBRUARY	1435	1505
MARCH	1817	1745
APRIL	1576	1756
MAY	2289	2799
JUNE	2719	2470
JULY	2736	2619
AUGUST	2979	3017
SEPTEMBER	2039	2644
OCTOBER	2368	2327
NOVEMBER	2387	2124
DECEMBER	1486	1544
TOTAL	26109	26187

GRAPH I

plants, provided data on the prevalence and treatability of these materials in Ontario.

For the Biology Branch, analyses of samples of surface waters and of the flesh of resident fish for pesticide residues was undertaken following instruction in applicable techniques at the federal government branch concerned with drugs. Analysis of samples of algae for minerals of consequence in nutrition were also under way at the year's end.

The Division of Plant Operations initiated a statistical study of the effect of time and temperature during the delivery of samples, on the results of ensuing BOD tests. Positive correlations were detected but further, more intensive work was needed on a wider variety of samples to establish the degree of change induced.

While the overall variation in monthly sample totals in Graph I shows a two-fold spread between 1,505 in February and 3,017 in August, two individual types of samples, "River" and "Industrial Waste", exhibited variations much in excess of this average, as well as a substantial increase over 1962 (see Table I). Fortunately, none of the individual peaks occurred simultaneously, and they averaged out to provide the substantial sample input during the spring and fall mentioned earlier.

During 1963, detailed monthly totals of the number of samples from each of the various agencies submitting samples were tabulated. Since this was the first such tabulation, previous totals were not available to allow comparison in detail. The proportion of samples collected by OWRC staff members, in total, decreased to 58.6% from the 1962 figure of 63%, instead of rising as was forecast. This was mainly due to a reduction in the rate of sampling by the Division of Plant Operations, which had been forecast to provide 23% of the total of samples collected during 1963.

It should be noted that in addition to samples actually collected by OWRC staff members, many were sent in at the request of the OWRC. This was true of most of the samples sent in by municipal agencies, from their water works systems and water pollution control plants. Thus, a total of at least 75% of the 1963 samples originated through OWRC programs.

Of the remainder, many provided information of value to the OWRC, which would be difficult to acquire otherwise. The Depart-

ment of Lands and Forests samples were submitted as part of the Patricia Lakes Study from lakes throughout Ontario, many of which were difficult of access, to provide an index of the basic mineral content as a guide to fish productivity. That Department provided a student technician during the summer to assist in analyzing these samples.

Table I

SAMPLE INPUT VARIATIONS
by type of sample

<u>Type of Sample</u>	<u>Monthly Minimum</u>	<u>Monthly Maximum</u>	<u>Variation</u>	<u>Yearly Total</u>	<u>Change From 1962</u>
Sewage	775 (Dec.)	1,124 (May)	1.5 fold	11,530	-7%
Water	501 (May)	712 (July)	1.4 fold	7,198	-2%
River	31 (March)	1,306 (Aug.)	42. fold	6,140	+18%
Industrial Waste	19 (Jan.)	356 (Sept.)	19. fold	1,319	+10%



Table 2

<u>CHEMISTRY BRANCH</u>		
<u>SUMMARY OF SAMPLE SOURCES</u>		
<u>SOURCE</u>	<u>NUMBER OF SAMPLES</u>	<u>% OF YEARLY TOTAL</u>
<u>Collected by OWRC Staff</u>		
Sanitary Engineering	7052	26.9
Plant Operations	4127	15.8
Laboratories	3300	12.6
Water Resources	<u>868</u>	<u>3.3</u>
OWRC Total	15,347	58.6
<u>Collected by Others</u>		
Ontario Government Departments:		
Lands and Forests	991	3.8
Conservation Authorities	120	0.5
Health	1098	4.2
Highways	102	0.4
Reform Institutions	244	0.9
H.E.P.C.	55	0.2
Others	<u>56</u>	<u>0.2</u>
O.G.D. Total	2666	10.2
Federal Government Agencies	590	2.3
Municipal Agencies	5352	20.4
Commercial Agencies	1413	5.4
Private	313	1.2
Miscellaneous	<u>506</u>	<u>1.9</u>
Total	10,840	41.4
<hr/>		
<u>1963 GRAND TOTAL</u>	26,187	100.0

The Department of Health samples were submitted by the local medical officers of health, mainly from private wells in which the water was of unsatisfactory quality. Samples from the Department of Reform Institutions and the federal government were mainly samples for the periodic evaluation of the treatment efficiency of the water pollution control plants at their various installations. Samples from "Commercial Agencies" included some from consulting engineers, but mostly were from industries with water quality or pollution control problems.

It was anticipated that if, as was previously suggested, special sampling surveys or projects could be undertaken during January, February and March of 1964 to take advantage of the laboratory capacity available during this period, that the 1963 figures, easily could be surpassed both for samples collected by the OWRC, and in total.

INDUSTRIAL WASTES BRANCH

Progress in the control and treatment of industrial wastes gained momentum in 1963, as the continuing efforts of the Commission produced worthwhile response throughout Ontario. Investigations and field studies totalled 214 and thirty-four meetings and consultations with industries and municipalities were held. Reports of investigations at 84 industries were prepared, ranging from single small-industry problems to detailed coverage of large integrated industries such as, pulp and paper mills, steel mills, and mining and smelting complexes. The examination of industrial discharges to municipal pollution control plants continued to form an important part of the field activities as the number of industries served by such facilities continued to grow.

Staff

A major revision in staff took place in 1963 with the move, in July, of A.J. Harris, Assistant Director of the Laboratories and co-Supervisor of Industrial Wastes, to the position of Director of Research. This was followed later by the transfer of F.J. Dart, Industrial Wastes Engineer to the new division in August. The Branch complement, reduced from 13 to 11, was filled by the end of the year with the addition of two engineers and one engineer's assistant. R.H. Millest, former Branch co-supervisor, with Mr. Harris, became Branch supervisor and was named Assistant Director of Laboratories.

CONTROL OF WASTES TO MUNICIPAL SEWERS

Investigations were made in 32 municipalities into municipal water pollution control plant overloading or malfunctioning due to industrial waste discharges. Although most of the major sources of industrial pollution were separate from municipal systems, the industries served by municipal sewers made up the greatest number of problems to be dealt with. Provision, by local by-laws, of a recommended sewer-use schedule permitted a fairly uniform approach throughout the province, although reluctance on the part of many municipalities to require realistic control of wastes before being discharged to the sewers continued to be a problem.

Because many of the process industries in the province were served by municipal sewers, the significant increase in the number of municipal treatment plants since Commission inception greatly reduced pollution in a number of areas. This, especially, was so in the Grand River basin where plants at Waterloo, Kitchener, Galt, Paris, and Brantford were treating industrial wastes which formerly sewered with little or no treatment. A projected joint municipal-industrial water pollution control plant at Elmira was expected to bring another outstanding industrial waste problem in the watershed under control when completed.

Northwestern Ontario

A complete review of all major industries in Northwestern Ontario was made again in 1963. Pulp and paper mill wastes continued to be of major importance (10 mills) although progress was made at all mills in providing improved in-plant controls. Extensive sampling at Red Lake indicated significant discharges of arsenic in gold mining and milling wastes, and efforts were continuing toward practical means of control.

North-Central Ontario

Industries in the Sudbury and Sault Ste. Marie districts were examined in detail. Completion of the Sudbury District Water Resources and Pollution Survey was followed by an extensive review of all industries in the district to permit the preparation of an additional detailed industrial waste report. The report material was finalized by the end of the year, and included a complete review of operating and waste disposal practices at all units of The International Nickel Co. of Canada, Ltd., and Falconbridge Nickel Mines, Ltd., as well as The K.V.P. Co., Ltd., Espanola; Lowphos Iron Ore Co., Ltd., near Capreol, and miscel-

laneous industries in the Sudbury area. As a result of the field surveys, treatment of mine waste water at one mine at Levack was undertaken, indicating a possible solution to this widespread problem in the area.

The occurrence of a major loss of oil to the St. Mary's River at Sault Ste. Marie led to a comprehensive survey of the major industries in that city. Corrective action was taken promptly by Algoma Steel Corp., Ltd., from which the oil had escaped, and a long-range program of waste control and treatment undertaken. Segregation of phenol-bearing wastes from the Tar Division of Domtar Chemicals, Ltd., was planned for re-direction of these wastes to the municipal sanitary sewers by agreement with the city.

Examination of the chemical and radiological characteristics of the wastes from the uranium mines in the Elliot Lake area was continued in close cooperation with the Industrial Hygiene Division of the Ontario Department of Health. Although water quality changes were pronounced it was not felt that any hazardous or deleterious effects had resulted.

The Toronto-Hamilton Area

Close liaison was maintained with the Industrial Wastes Branch of the Metropolitan Toronto Department of Works in the examination and surveillance of industries discharging wastes to streams or Lake Ontario in the Metro area. In Hamilton, a detailed study of the large industries located along the bay-front was carried out, resulting in the submission of large-scale multi-million dollar waste treatment proposals by the Steel Company of Canada, Ltd., and Dominion Foundries and Steel Co., Ltd. The proposed undertakings, together with the construction of water pollution control facilities by the city, were expected to greatly reduce the existing pollution of Hamilton Bay.

Construction of complete waste treatment facilities at the new refinery of the Shell Oil Co., Ltd., at Bronte, as part of the initial refinery installation, again demonstrated the cooperation that has been obtained from the petroleum industry. Improvements in existing treatment and control facilities at the British-American Oil Co., Ltd., at Clarkson and Texaco at Port Credit also were noteworthy.

Plans for extensive reconstruction of waste treatment facilities at the Burlington plant of Hercules Powder Co., Ltd., also were finalized for action in 1964.

Completion of the plant of Northern Electric Co., Ltd., at Bramalea included the provision of complete treatment facilities for all plating wastes. It was worth noting that this installation represented the ultimate in waste water handling, since the treated wastes were of sufficiently high quality to be returned to processes in which water quality requirements were high.

The St. Lawrence Seaway

Expansion of industry throughout the Lake Ontario-St. Lawrence Seaway area continued as new-industry locations were indicated and existing industries continued to expand. Surveys throughout the area were continued to keep abreast of these developments, and to work with municipal personnel in dealing with the growing use of municipal sewerage facilities.

Niagara Peninsula

Complete surveys of industries located along the Old Welland Canal and along the Welland River below the City of Welland were made in keeping with the activities of the Commission with respect to municipal sewage treatment in the area. Because of the lack of dilution in the Old Canal, pollution was very severe, and, since there did not then appear to be a practical solution to many of the waste disposal problems, studies were undertaken for continuation in subsequent years, to seek improved in-plant pollution control and to develop a staged program of waste treatment.

General

The study of problems on an industry-wide basis was continued with industries in the pulp and paper, meat packing, tanning, and plating fields. Meetings were held with the Pulp and Paper Industrial Waste Liaison Committee and a beginning made in seeking technical information regarding waste measurement and control for compilation and use by the industry at large.

Close contact was maintained with companies proposing new industrial operations in the province, and proposals from 15 were discussed or received and reviewed prior to new-plant construction. Recording of all pertinent industrial information, for both new and existing industries, was continued to ensure an up-to-date inventory and reference of all major sources of industrial wastes in Ontario.

PURIFICATION PROCESSES BRANCH

The Purification Processes Branch was formed with the idea of building up a group of engineers familiar with the chemical engineering aspects of water and waste water treatment. At that time there were no chemical engineers with this training available and it was necessary to hire recent graduates and train them. This was a slow educational process, but the stage had been reached where the OWRC was beginning to derive many benefits from this group. A review of the work carried out by the branch in 1963 shows that approximately 70 per cent of its activity was in co-operation with other divisions, with municipalities and with consulting engineers in problems requiring the application of chemistry and chemical engineering in water and waste water treatment.

WATER TREATMENT

In the water treatment field the following investigations were made:

Taste and Odor Control

One of the most urgent problems encountered during the year involved the complaints of adverse tastes and odors occurring in municipal water supplies. Investigations and studies were made to find some methods of controlling these problems at Chatham, Kirkland Lake, Little Long Rapids, Peterborough and Trenton.

Laboratory tests on the samples of water received from Kirkland Lake revealed that break-point chlorination was the most practical method of controlling taste and odor conditions.

Early in June, the water supply for the City of Peterborough was beset by severe taste and odor problems. After conducting a week-long study involving break-point chlorination, superchlorination, chloramine, activated carbon and potassium permanganate treatment, it was found that a treatment with a dosage of 1 to 2 p.p.m. of activated carbon was the most effective method of reducing the odor levels in the water. It should be noted that condition of the raw water had improved very markedly during the time of these tests. Similar problems also were experienced in the water supply for the City of Trenton during the late summer. Studies here also were suspended temporarily due to the noticeable improvement in the raw water.

In September, a problem of severe taste and odor had been re-

ported in the water supply for the Ontario Hydro camp on the Mattagami River at Little Long Rapids. It was found that these conditions were partly caused by uncontrolled discharges of large volumes of paper mill wastes into the river at Kapuskasing and further aggravated by the land flooded by the new dam on the Mattagami River. The latter had a tendency to cause low dissolved oxygen levels and this, in turn, led to anaerobic conditions in the river giving rise to the production of taste and odor-causing substances.

Plant trials at Chatham water works were made to evaluate the use of potassium permanganate as a possible method of controlling bad tastes and odors in the water under extreme conditions. Threshold odor tests carried out concurrently with the plant tests indicated a definite improvement in the water after treatment, and the use of potassium permanganate was recommended conditionally.

Chlorination Studies

At Sarnia waterworks, chlorination tests were made to determine:

- i) break-point
- ii) free residual chlorination
- iii) the presence of interfering substances which may affect the orthotolidine tests..

As a result of this work at Sarnia, it was decided that these studies should be made at many other water works in Ontario and to facilitate this work, an amperometric titrator was purchased for measuring chlorine residuals.

Upflow Solids Contact Unit

The branch was asked to participate in some pilot studies at Iroquois Falls to determine whether or not an upflow solids contact unit was the most practicable method of clarifying water so that its quality after treatment would be satisfactory to both the domestic and industrial users. The results of these tests were satisfactory and the paper company was considering building this type of water treatment plant.

Diatomaceous Earth Filtration

During the year, pilot studies on the operation of a diatomite filter unit set up in the OWRC Laboratory were started and

the water drawn from the Humber River was filtered through it. In spite of experiencing considerable amounts of difficulties at the beginning, 26 filter runs were obtained, ranging from 30 minutes to over 30 hours working with water containing turbidities of 10 to 90 units.

Coagulation Tests

Coagulation tests were made in a sample received from the Village of Eganville and also on a sample sent in by Trans-Canada Pipe Lines taken from a water supply near the Town of Haileybury. As a result of these tests a recommendation was made of the amount of alum required for the best treatment of these waters.

Stability Tests on Well Samples

Stability tests were made on samples of water obtained from wells in Stratford and Port Perry. The results of these tests were sent to the engineers in charge of these projects.

Model Studies to Determine Dilution Factor of the Welland

Members of this branch took part in model studies conducted by Ontario Hydro to determine the effect of pollution from the Welland River on the Niagara River at the site of an intake proposed for a water treatment plant which is to serve the City of Niagara Falls.

Staining at Dunnville

An investigation was made at Dunnville into a problem of staining at the local knitting mill. The cause was suspected to be the water supply and tests indicated that the use of potassium permanganate at the water works resulted in the staining problems. The stains were of a manganese type and the curtailing of the use of permanganate solved the problem.

Scale Formation in Cooling Tower

The forest pathology laboratory at Maple asked for help in solving a problem of scale formation and algae growth in its water cooling system. Analyses were made of the scale and recommendations were made for correction of this condition.

Special Studies

Settling tests were conducted on samples of waste effluents

from coated-paper manufacturers in Georgetown and Scarborough and a sugar beet processing plant in Chatham. A special study was undertaken to evaluate powdered activated carbon samples used in field of water treatment.

Slime Growths - Simcoe

An investigation was made of slime growth in the water from a spring area used by the Town of Simcoe. Analysis indicated pollution from a small stream flowing through the spring area. It was recommended that water from these springs be chlorinated and that consideration be given to replacing the springs with wells constructed so that there would be no direct infiltration from the stream.

WASTE WATER TREATMENT

In the sewage treatment field a number of operating problems have been investigated, and also, studies have been made of new chemical analyses and technical equipment that might be used to improve the operation of pollution control plants.

Georgetown W.P.C.P.

The evaluation tests on a mechanical aerator, which were started in the fall of 1962, were continued until July 1963. The main points of interest were: 1) the operation of the aerator under winter conditions, 2) the ability of the aerator to maintain the mixed liquor solids in suspension, and 3) the bottom velocities produced by the aerator in mixed liquor.

Other work done at Georgetown consisted of: 1) general observations on plant performance, 2) distribution of dissolved oxygen throughout the aeration system, 3) evaluation of two methods of determining the rate of oxygen absorption of an aeration system using the aeration tank mixed liquor as test medium.

Effect of Temperature on Rate of Aeration

A review of pertinent literature, as well as a series of special aeration tests on a pilot scale mechanical aerator, indicated that the correction factor $K_{20} = K_T \times 1.024^{(20-T)}$, as used by a number of authors, expressed the effect of temperature correctly. K was the rate constant of oxygen absorption, and T was water temperature in degrees centigrade.

Paris W.P.C.P.

In the fall of 1962 acceptance tests had been carried out on the newly installed aeration equipment. Since the consulting engineer doubted the accuracy of the test results, it was decided to repeat the aeration tests in the spring of 1963. Reproducibility of the results was demonstrated. Both series of tests were run in co-operation with the Division of Plant Operations.

London-Greenway Pollution Control Centre

Assistance was given to the consulting engineer in the carrying out of acceptance tests on a mechanical aerator which was proposed for installation in the Greenway plant extension. The averaged results agreed well with test data obtained in previous tests on an identical aerator at Georgetown.

Laboratory Aeration Tests

A mechanical --Vortex type of 20-inch aerator was tested in the laboratory test-tank. A number of tests was run, to determine the variation of the rate of oxygen absorption with immersion at constant aerator speed, and with aerator speed holding the immersion constant.

Tillsonburg W.P.C.P.

An investigation of the aeration system in this plant showed that complete mixing occurred in the aeration tanks. This was determined by means of tracer studies which indicated flow-through patterns similar to those in completely-mixed tanks. As a result, observations made previously regarding the operation of the plant's activated sludge process could be explained satisfactorily.

Determination of Mean Detention Time

Subsequent to the tracer tests at Tillsonburg, similar tests were carried out in the spiral-flow diffused-air system of the Streetsville W.P.C.P., and also in the laboratory on bench-scale completely mixed systems. A suitable technique was to be developed for the efficient performance of full-scale tests.

Evaluation of a Dissolved Oxygen Meter

A considerable amount of time was spent on the evaluating of

a membrane-type electrode D.O. meter. Tests showed that electrode response time and meter stability needed to be improved. Tests on a modified instrument indicated that the problems had been corrected.

Automatic Control of Activated Sludge Process

A study was started on the use of "Totamitors" for the automatic control of the activated sludge process at the Drury Lane Water Pollution Control Plant. The control was based on maintaining a constant ratio of activated sludge solids to primary effluent solids by controlling the return sludge rate. The "Totamitors" were used to measure the solids concentration at various points.

Sludge Bulking at Waterloo W.P.C.P. Due to Sphaerotilus

A very unusual problem was investigated at the Waterloo W.P.C.P. which experienced extremely severe sludge bulking problems in the fall. A very prolific growth of Sphaerotilus was present. This situation was due to industrial wastes which created a very high ratio of carbon to nitrogen, very conducive to the growth of Sphaerotilus. This problem was resolved by chlorinating the return sludge at a prescribed dosage for a period of about seven days.

Tertiary Treatment at Brampton W.P.C.P.

This branch was active in the planning stages of the tertiary treatment project being undertaken at the Brampton W.P.C.P., but the project was transferred to the control of the Division of Research.

Ontario Hospital - Cedar Springs

On a request from the Division of Sanitary Engineering, a laboratory technician from the branch was sent to the Ontario Hospital at Cedar Springs to instruct the operator there in methods of chemical analyses of sewage and water.

North Bay

On a request from Division of Plant Operations, a technician was sent to the W.P.C.P. at North Bay to make an analysis of the gas from the digester and to instruct the operators in the chemical analyses necessary for operation of a sludge digester.

INDUSTRIAL WASTE

In industrial waste there were only two projects to report, but one of these required a large number of man hours.

Chatham Research Project

A major project in the past year was the work associated with the Chatham research project on the treatment of cannery wastes. The technicians of the branch were responsible for all the analytical and sampling work involved in the project. This involved considerable time on behalf of the staff as the field work began in mid-June and was completed about the first of November.

Measurement of Industrial Waste

A brief was prepared on the methods of measurement which would be applicable to determining flows of industrial wastes.

NEW EQUIPMENT

This branch acquired two new pieces of equipment this year that will widen the scope of the work.

Gas Partitioner

For years, OWRC laboratories had to refuse to do gas analyses because of a lack of proper equipment. With acquisition of a gas partitioner it became possible to make analyses of methane, carbon dioxide, nitrogen and oxygen and mixtures of these gases. Rapid analyses of digester gas would be possible, and it was expected to prove useful in solving some of the problems met with in operating sludge digesters. With slight modification this equipment also could be used for analysis of gases other than those mentioned above.

Recording Conductivity Meter

This equipment had a number of uses in the laboratory and also in the field. It could be used for tracing flows when salt was used as an indicator and for determining the retention period of a tank. It would be useful for detecting infiltration of ground waters and the presence of inorganic pollutant in water supplies. In general, it could be said that this equipment would be useful any time a rapid estimation of the inorganic chemical content of a water was required.

ANALYTICAL WORK

There was a marked increase in the amount of analytical work done by this branch. There was a total of 21,395 determinations made, the greater part being done in the field. There were 928 samples sent to the laboratories for analyses. Of this number 510 were sent to other OWRC laboratories for routine analyses and 418 were retained in the branch laboratory for special analyses.

CONFERENCES

Staff was represented at a technical orientation course at the Civil Defence College in Arnprior, a meeting of Canadian Pulp and Paper Industrial Waste Liaison Committee in Montreal, the 10th Industrial Waste Conference at Honey Harbour, Ont., and the 18th Industrial Waste Conference at Purdue University.



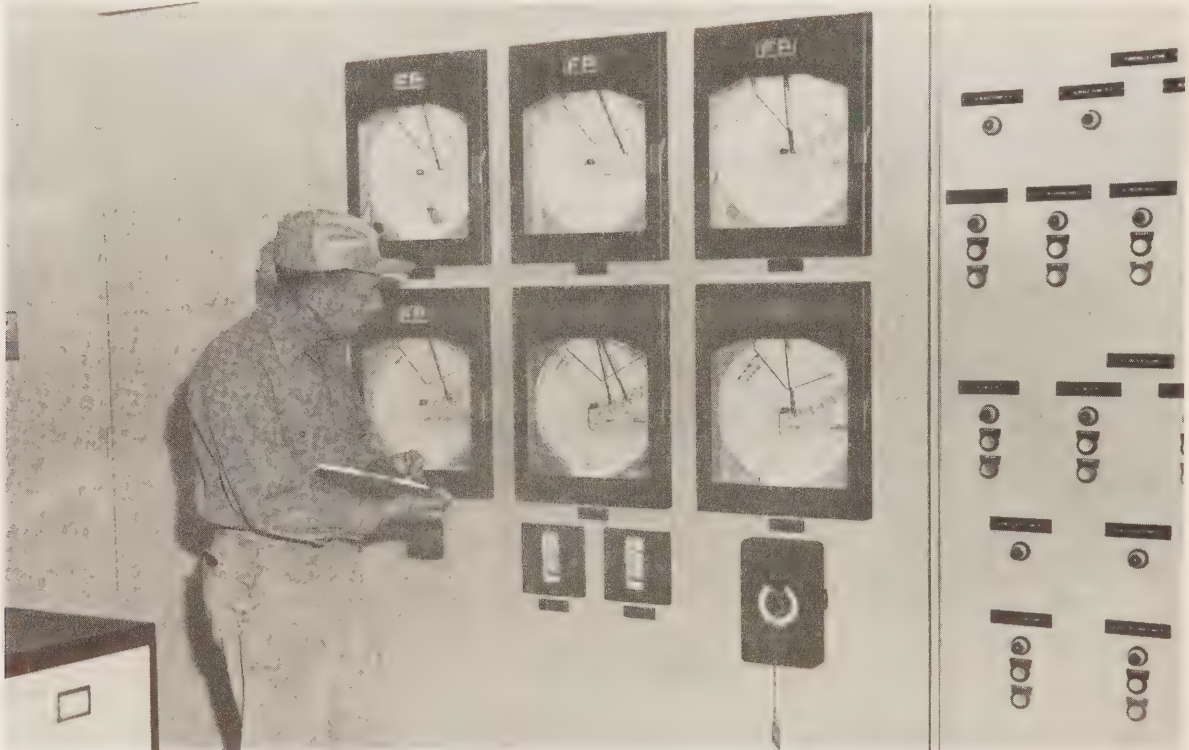
Division of Plant Operations

B. C. Palmer, Director

C. W. Perry, Assistant Director

The appointment of D. S. Caverly, director of the division to the position of general manager plus an expansion of activities, necessitated a major revision in the division's administrative structure early in the year. The organization structure as of December 31, 1963, is summarized in Chart #1. B. C. Palmer, formerly the division's assistant director, succeeded Mr. Caverly as director.

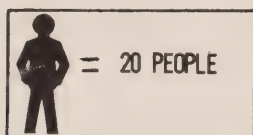
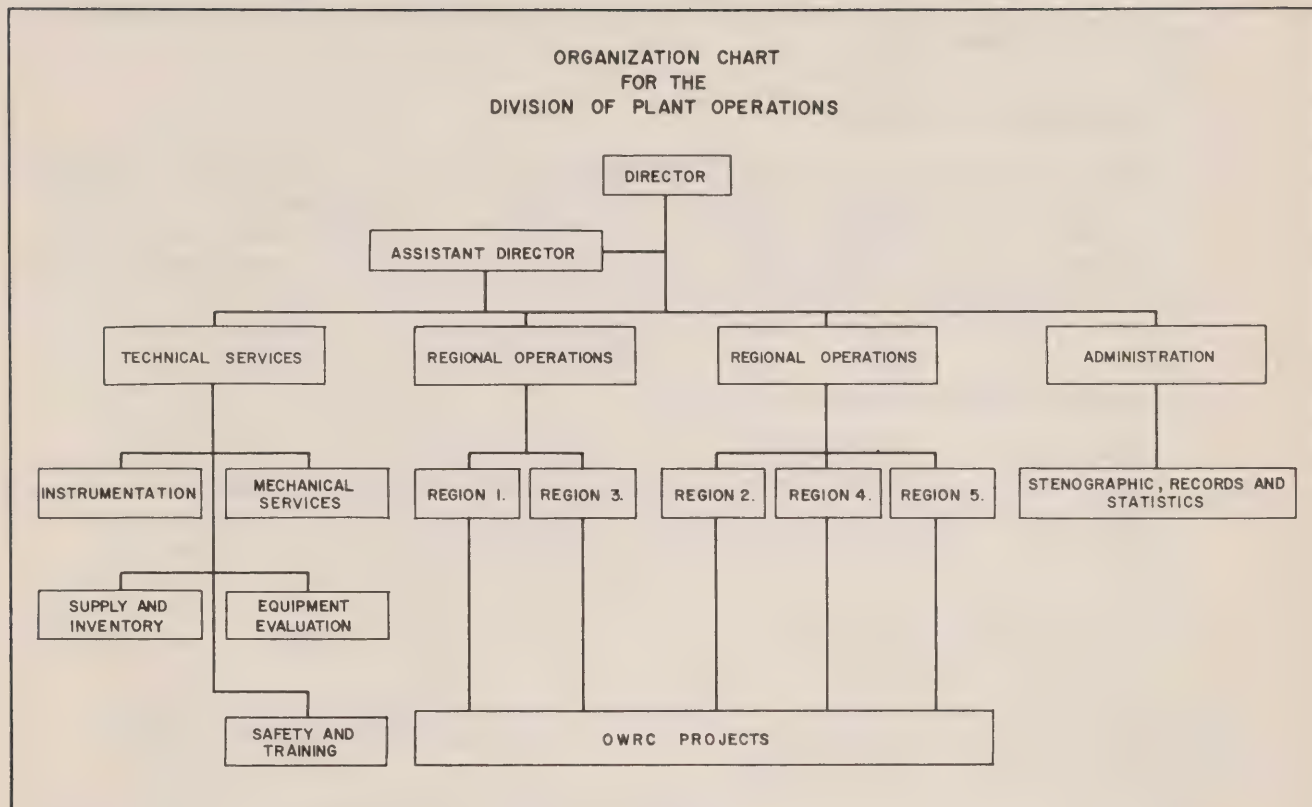
In 1963, 36 new projects were put into operation. This represented an increased capital investment of \$19,942,000 over the 1962 year-end total of \$60,712,000. The number of projects in operation increased by 23 per cent. Their capital value increased during the year by 33 per cent. At the same time head office staff increased from 41 to 44.



Field Activities

Operations Engineers and Assistant Engineers

These men were responsible to the two regional assistant supervisors. Their duties included operator instruction, establishing quality control, reviewing hours of work,



**DIVISION OF PLANT OPERATIONS
STAFF COMPLEMENT**

HEAD OFFICE



OPERATING



setting shift schedules, preparing budget estimates, meeting with local municipal officials, establishing maintenance repair procedures.

Technical Services

The Instrumentation and Mechanical Services sections reviewed plans for new projects, checked out equipment of new plants, instructed plant operators in routine and emergency repair procedures and regularly inspected all equipment in each project. They also provided technical assistance to all plants during emergencies.

Safety and Training Officer

The safety and training officer reviews all plans for new projects, inspects plants in operation and is responsible for the development of safety procedures. He also gives initial "in plant" training to staff in new projects.

Head Office Support

Records, statistics, supply and inventory, clerical and stenographic support were provided by head office engineering assistants, clerks and typists.

Statistical Summary

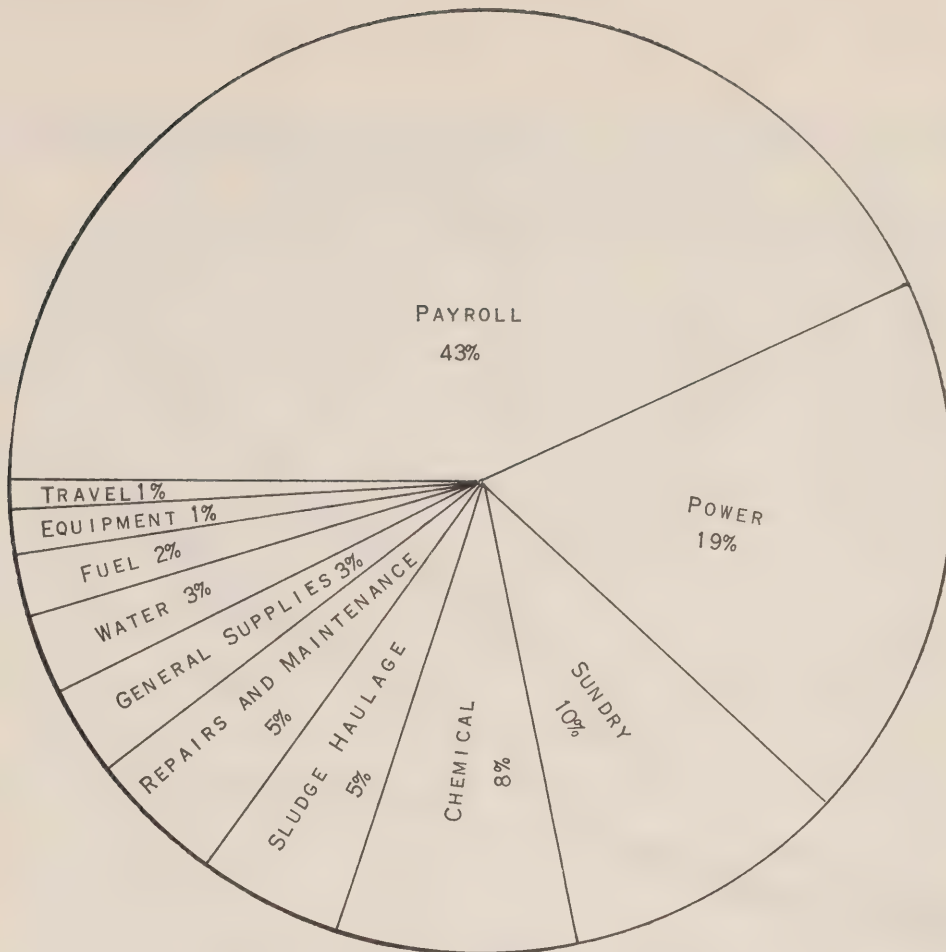
The following statistics are indicative of the program of the Division:

- (a) Total capital costs of works in operation as of December 31, 1963:

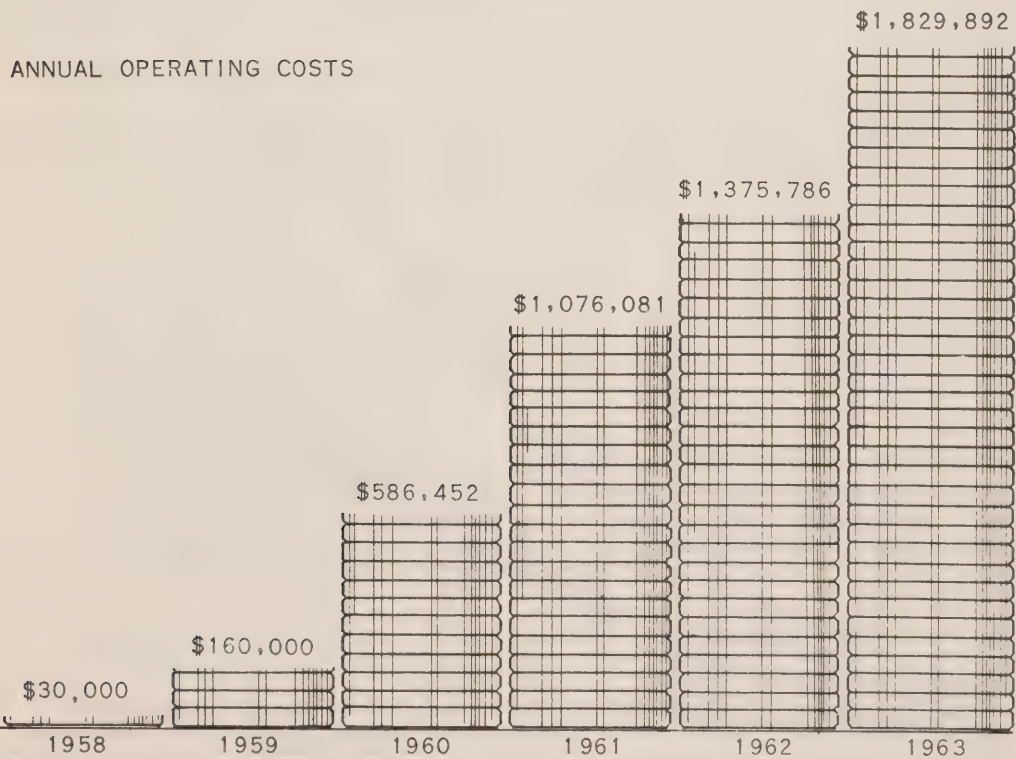
Pollution Control Projects	\$58,753,000	
Water Projects	<u>21,901,000</u>	
TOTAL		\$80,654,000

Capital value of works which came into operation in 1963:

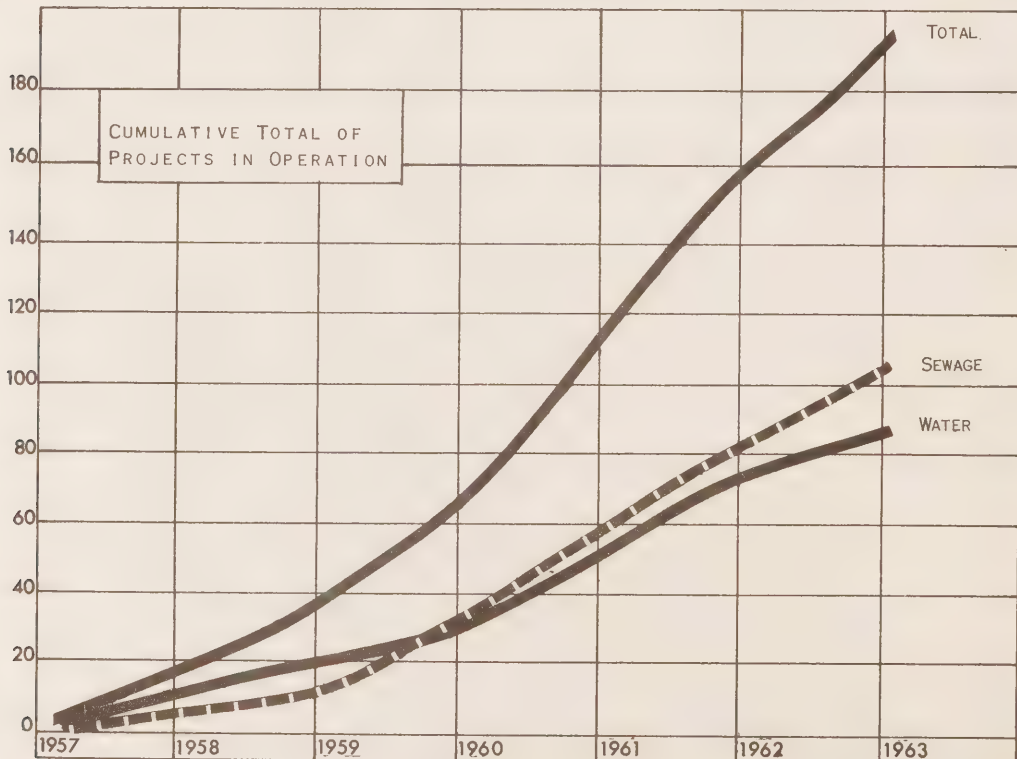
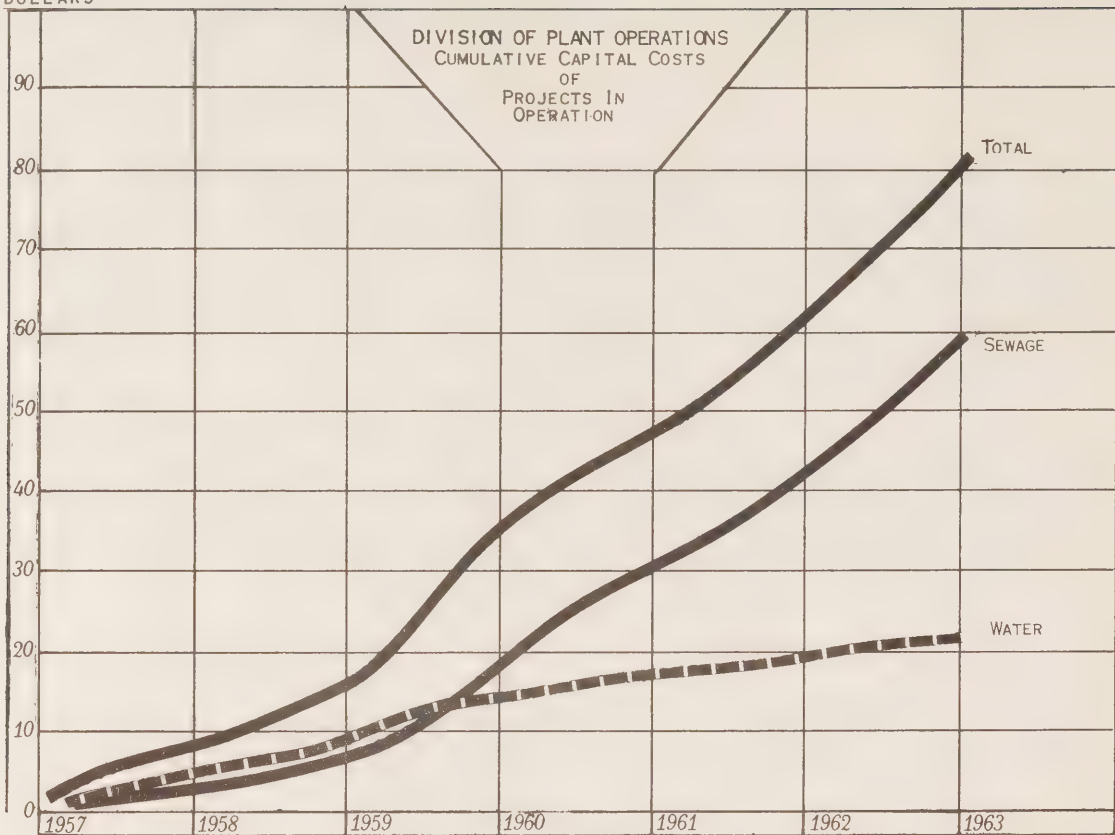
Pollution Control Projects	\$16,741,000	
Water Projects	<u>3,201,000</u>	
TOTAL		\$19,942,000



ANNUAL PROJECT OPERATING COSTS



MILLIONS
OF DOLLARS



(b) Projects in Operation.

<u>Year</u>	<u>Water</u>	<u>Sewage</u>	<u>Total</u>	<u>Increase</u>
1958	9	6	15	
1959	21	13	34	19
1960	32	33	65	31
1961	53	58	111	46
1962	74	81	155	44
1963	85	106	191	36

(c) Total Operating Costs of Projects - 1963

Water	\$ 393,000
Sewage	<u>1,437,000</u>
TOTAL	\$1,830,000

(d) Total Operators on OWRC Payroll

1958	15
1959	22
1960	92
1961	145
1962	162
1963	191

(Water systems operators = 36; Pollution control operators = 155)

Ten of these were part-time operators.

(e) Total volume of sewage treated in 1963 = 19,137.695 mg.
Average cost of mg of sewage treated \$69.56
Average cost of mg of water treated \$51.59

Projects which came into Operation in 1963

Water Projects

60-W-60	Wellington	62-W-102	Richmond Hill
61-W-83	Beaverton	62-W-103	Saltfleet Township
61-W-86	Sault Ste. Marie	62-W-104	Markham Township
61-W-91	Toronto Township	62-W-106	Englehart
62-W-97	Toronto Township	63-W-112	Neelon & Garson
62-W-99	Brantford Township		

Sewage Projects

58-S-14	Brampton- Plant Extension	58-S-19	Kitchener- Plant Extension
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59-S-39	Fort Erie	62-S-111	Sudbury
60-S-53	Sudbury	62-S-114	Arthur
60-S-60	Seaforth	62-S-117	Korah Township
60-S-71	Timmins	62-S-118	Elmvale
61-S-90	Galt	62-S-120	Simcoe
61-S-98	Kingston Township	62-S-121	Sidney Twp. - (Batawa)
62-S-101	Port Arthur	62-S-126	St. Catharines
62-S-103	Twp. of Widdifield (Sage)	62-S-127	Gananoque
62-S-105	Burlington (Skyway)	62-S-128	Saltfleet Township
62-S-106	Michipicoten Twp. (Wawa)	62-S-130	Almonte
62-S-107	Niagara	62-S-131	Englehart
62-S-109	Chesley	62-S-133	Burlington (East)
		62-S-135	Burlington (West)

The 191 projects in operation served a total of 135 municipalities and five industries and could be broken down to show the following operating facilities:

<u>Sewage Facilities</u>		<u>Water Facilities</u>	
Primary Treatment Plants	10	Treatment Plants	16
Secondary Treatment Plants	23	Wells	31
Lagoons	22	Standpipes	12
Sewers & Pumping Stations	47	Lake Intakes	9
Total Oxidation	2	Reservoirs	9
Trickling Filter	1	Mains Only	15

Projects which came into operation during 1963 break down as follows:

<u>Sewage Facilities</u>		<u>Water Facilities</u>	
Primary Plant Extension	1	Treatment Plants	1
Primary Plants	2	Wells	3
Secondary Plants	2	Standpipes	1
Lagoons	8	Lake Intakes	1
Sewers and Pumping St.	11	Reservoirs	1
Total Oxidation	1	Mains Only	3
Secondary Plant Extension	1		
Primary to Secondary Plant	1		

Local Advisory Committees

Local Advisory Committees composed of elected and appointed municipal officials continued to function effectively in providing

liaison between the OWRC and the municipalities in the operation and administration of the projects.

During the year staff of the Division of Plant Operations attended 95 Local Advisory Committee meetings.



Division of Research

A.J. Harris, Director

The year 1963 proved to be a very stimulating development period for the research activities of the Commission. With the inception of the Division of Research, a number of inaugurated research projects became co-ordinated under one responsibility with some expansion of these opportunities being provided both at that time and for the future.



In early May a special request for an additional allowance was granted by the Provincial Treasury to expand the modest budgetary allowance earlier allotted for research in 1963-64. In July, a director was appointed and commissioned to assist in the formation of a personnel nucleus for the division. In the latter activity, certain personnel transfers from other divisions were made and by September, a staff of six persons had been obtained. In December the division's headquarters on the main floor of the laboratories building were prepared for subsequent occupation.

During the division's development, the direction and responsibility for current research projects were gradually assumed. Current algae control studies then being carried out by the Biology Branch of the Division of Laboratories evolved into a Division of Research responsibility. Another research study of canning wastes treatment by oxidation lagoons at Chatham was accepted from the Purification Processes Branch of the Division of Laboratories.

In addition, a third and fourth major responsibility for future operational studies of tertiary treatment pilot plant lagoons at Brampton-Chinguacousy and an oxidation ditch evaluation was assumed.

RESEARCH PROJECTS

1. Algae Control Program

The Biology Branch of the Division of Laboratories continued to supervise much of the algae control program for the research division. This program itself had many avenues of endeavor.

New algicidal chemicals were evaluated. Early in July, 4,000 pounds of Hydrothol were tested along 2,400 feet of shoreline at Crystal Beach with beneficial results as expected. Further test situations did not develop in the province until September when secondary growths re-established themselves about the local out-fall areas at Crystal Beach. Thus at this time further testing was possible using the chemicals Brestan and Niagara Brand 5625. These latter tin-based compounds, particularly Brestan, seemed to be even more potent as algicides and were to be investigated in detail in future studies.

In addition to attempting to eradicate the nuisance algae *Cladophora*, successful attempts at artificial stimulation of its growth in local test areas were made in order to determine those nutrients essential for growth. During the summer months, four types of fertilizers were added to suitable underwater sites. Growth stimulation at two of the sites confirmed that phosphate was the key nutrient for the algae's active growth. With this significant finding, procedures to help check development of algal nuisances could be effectively directed at control of phosphate materials within algae-susceptible water bodies. The mode of development of the test plot stimulated further consideration as to how such algae could be obtaining their necessary nutrition.

The development of mechanical principles of algae harvesting and clean up was actively pursued. In July, a tractor-mounted version of a street-sweeper employing special brush systems was trialed at Crystal and Silver beaches. The unit proved to be limited in ability largely because the brushes appeared to be inefficient in dislodging algal growths from their underwater bed-rock attachments. Testing was continued until shore accumulations diminished.

More promising, however, appeared to be the principle of

dislodging algal growths by a high pressure jet of water. Preliminary tests demonstrated the desirability of mounting such a system on a mobile collector unit for shallow water use. Consultations were held with the engineering staff at the Ontario Agricultural College to further develop this principle.

The potential uses of collected algae were investigated particularly with respect to nutritional values that might be found useful as a livestock feed supplement. While the Commission's laboratory undertook to determine the mineral constituents, specialized analyses were necessary. These special analyses were contracted to Howard Agricultural Laboratories after consultations with the Ontario Research Foundation and the Quaker Oats Company in Peterborough.

Throughout the season, right into December, an unbroken program of surveillance of algal growth in Lake Ontario and Lake Erie waters was maintained. In general it appeared that Lake Erie had a relatively mild growth season with some exceptions about the Crystal Beach area. Growths in Lake Ontario on the other hand were relatively heavy particularly on the north shore between Toronto and Hamilton. Survey information was obtained by boat, shore observations and scuba diving. Aerial photography assistance was provided by the Department of Lands and Forests.

During the latter part of the year, a number of the year's findings were made known to the Commission Management Committee and certain interested groups outside the Commission. At the year's end, however, the division was still evaluating the season's data in greater depth.

2. Oxidation Lagoon Studies

(a) Treatment of Cannery Wastes at Chatham

A small scale pilot plant project for the treatment of canning wastes by aerated lagoons was operated at Chatham from June until November. The treatment of pea-pack and tomato-pack wastes from the Campbell Soup Company began originally under the supervision of the Division of Laboratories' Purification Processes Branch. During August the responsibility for the research project gradually shifted to the Division of Research although the Purification Processes Branch staff continued to aid in the operation of the units.

Essentially, the site consisted of four lagoons arranged to

give three main alternatives of treatment.

- (i) Lagoon #1 ($\frac{1}{4}$ acre) was aerated with a grid of perforated and lead-weighted plastic hose lines.
- (ii) Lagoon #2 ($\frac{1}{4}$ acre) was a twin to lagoon #1 except for a more intense aeration grid of plastic hose and a 12-foot deep anaerobic basin, four feet below the aeration grid levels.



- (iii) Lagoon #3 (24 feet square) was aerated mechanically using a Simon Carves 3.5 foot diameter aerator wheel on a 3 HP motor unit. A portion of its effluent was the feed for lagoon #4.
- (iv) Lagoon #4 (0.06 acres) had no supplementary aeration devices being loaded by effluent from lagoon #3.

The lagoons treated pea-pack wastes from June 24 to July 30 and were maintained under aeration until the tomato-pack wastes became available in mid-August, lasting until October 21. Aeration was continued into November when oxygen supersaturation developed through increased algal activity. In general, the lagoons worked well with loadings up to 600 pounds of 5-day BOD per acre per day being tried successfully in lagoon #2.

The problem of lagoon leakage was encountered. This factor resulted in no overflows from lagoons 1, 2, and 4. In addition, a 3 HP air supply unit had to be eventually replaced by a 10 HP unit. Algae growth at some periods was poor and the Biology Branch was called in for advice.

However, the main problem centred about the plastic aeration hose system. While slime and algae had been under suspicion as to the plugging up of the air pore slits in air feed lines, later close examinations demonstrated that micro-quantities of hardness scale tended to plug the holes. Back-pressure effects appeared within three weeks. It was believed that carbon dioxide stripping by air-water interfaces tended to precipitate calcium carbonate from soluble calcium bicarbonate.

Development of preventive measures against the scaling problem was under study by the year's end. Reproduction of the scaling conditions in an indoor tank divided into four sections was being undertaken. Preliminary tests at Chatham had indicated that the introduction of scale dissolving materials, such as hydrochloric acid even in vaporized or atomized form would exert a rapid and positive cleaning action on air hose lines. Possibilities for development of a practical descaling system appeared very good in the new studies.

Other miscellaneous issues to be resolved in 1964 included the wintering ability of the plastic hose equipment left in the ponds. Most of the other components were not so exposed, however. The mechanical aerator was dismantled and removed, while air compressors, and pumping equipment were sheltered and prepared for the freeze-up. Financial costs for the project were forecast by the end of the year in order to predict the cost to be shared by the municipality.

(b) Oxidation Ditch Studies

Interest in a new variation of sewage treatment originating in Europe began to take hold in the Commission early in September. Contacts with Canadian agents of the equipment manufacturers gave the division a considerable amount of preliminary information to consider concerning theory and practice of the new units called "Oxidation Ditches". The treatment system appeared to be somewhat intermediate in cost, process operations, and size between sewage lagoons and activated sludge plants. In this system sewage was paddled around a racetrack-shaped ditch by means of a metal-bladed rotor of two types, Kessener brush and Cage rotor. The mechanical power of the bladed rotor provided mixing and aeration simultaneously. A sludge was removed from the effluent, either by draw and fill techniques or continuous settling.

One outstanding weakness in the units might be their susceptibility to freeze-up in severe winter climates. The literature at

best cites an 18°F operability provided the rotor was suitably baffled. A 4,800-gallon unit in Regina froze solid with a minimum of baffling but further tests were forthcoming. Meanwhile no results had been authenticated regarding successful operation in really severe weather as most units tended to be situated in areas of milder winter climates.

Costs estimates were compared between building and evaluating a pilot-plant unit, and evaluating a full-scale plant outside Ontario. As outside evaluation would cost only one third the cost of a pilot plant construction, arrangements were being made to visit and obtain direct data outside Ontario. In this effort a very thorough study of the literature available was being concluded in preparation for such studies.

3. Tertiary Treatment at Brampton

The decision to try a pilot plant tertiary treatment lagoon system for the Brampton sewage treatment effluent was made during the year. One lagoon was to be a deep artificially aerated unit while a second lagoon, one acre in area, was designated to be of a conventional nature. The hope was to establish that the sewage treatment plant effluent quality could be improved suitably for discharge to Etobicoke Creek which had very low dilution at some seasons. Even complete secondary sewage treatment was limited in its ability to remove sufficient phosphate, nitrogen compounds, and refractory organic materials, such as detergents, from sewage to produce a water quality comparable to the indigenous variety. Failure to be able to complete treatment to the desired extent would necessitate a long discharge pipeline to Lake Ontario to avoid excessive fertility problems in the creek itself.

Efforts to get the lagoons constructed before the winter freeze-up were frustrated by a series of temporary difficulties. In July, the consulting engineer's plans were required to be changed in order to create a lagoon of a more conventional square outline. Later, in September, the construction bids proved to be considerably higher than expected. However, the municipalities granted an additional cost increase, but it was discovered that concession rights for two outlet ditches across privately owned land to Etobicoke Creek had not been completed. However, the Commission's Property Branch was able to reach agreement where the consulting engineer had failed and the contractor was able to complete the coarse construction and grading before the year's end.

Meanwhile, personnel in the research division were able to

engage in considerable literature study regarding tertiary treatment matters. Testing programs were planned, instrumentation considered, and laboratory testing of phosphate removal by iron compounds was briefly studied.

Miscellaneous Activities

During the latter part of the year, it became possible for the division to be represented at a number of informative meetings, including the Canadian Chemical Producers Association's water pollution symposium at its general meeting in Ottawa. A meeting with the research director of the E. B. Eddy Company gave some informative insight into possible future developments in sulphite pulp cooking procedures, from which the main waste loading from paper mills was derived. Simultaneously a tour of the National Research Council was possible in an informal exchange of research technology. A meeting with the Technical Liason Committee of the Canadian Pulp and Paper Association brought to light a new area for fruitful research in the need for an improved technique for sampling wood fibre in streams below a paper mill. The year 1964 likely would see this approach investigated.

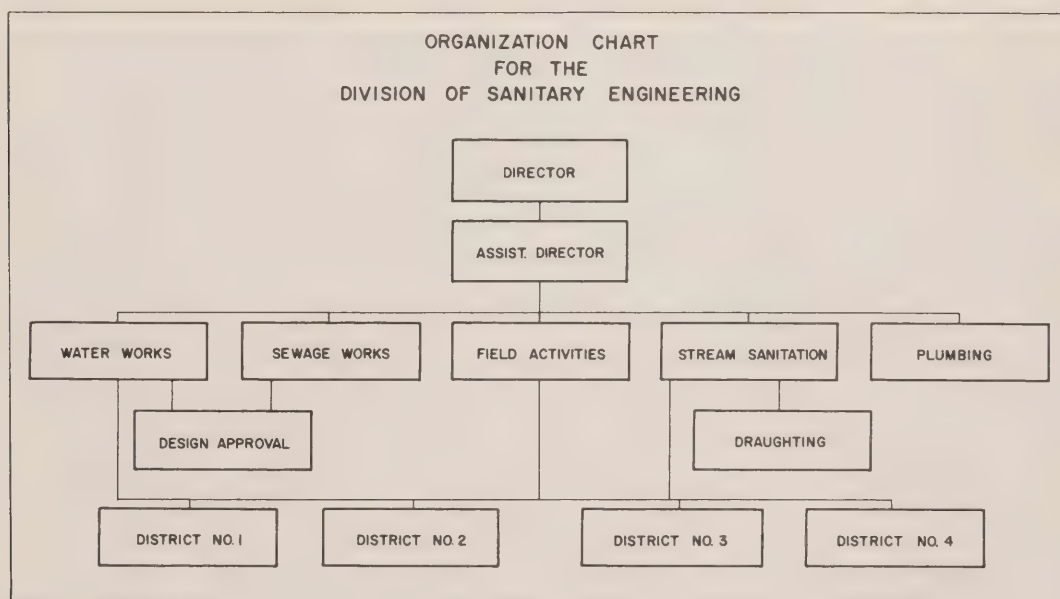
Other matters included discussions with Miles Laboratory of Elkhart, Indiana, and Josam Company in regard to the use of enzymes for organic material breakdown in drain, septic tanks, and digesters.



Division of Sanitary Engineering

K. H. Sharpe, Director
J. R. Barr, Assistant Director

The responsibility and functions of the Division of Sanitary Engineering may be divided into four main categories: (1) the evaluation of plans of proposed water supply and waste water treatment installations, (2) the inspection and supervision of water and waste water treatment plants in the province, (3) the study and abatement of pollution in the waterways of Ontario and (4) the supervision of plumbing. In this work, the division co-operated not only with other divisions of the Commission but also with the Department of Municipal Affairs (Community Planning Branch) and the Ontario Department of Health (Environmental Sanitation Division) in the review of subdivisions and inspections in the field of water supply and sewage disposal, closely allied to the work of the public health authorities.



The various programs of the division were carried out by a staff of professional engineers and technical personnel in several branches under the supervision and control of an administrative staff. With the taking on of full-time duties as an assistant general manager of the Commission by the division director, G. M. Galimbert, during the year, K. H. Sharpe, assistant director, and supervisor of water works, was appointed director.

There were 29 graduate engineers and 13 engineering assistants on the staff of the division at the end of 1963.

District Engineering Branch

Numerous changes were necessitated during the year due to promotion of senior staff and personnel leaving the employment of the Commission. The field work continued to be carried out under the supervision of four district engineers each of whom covered a designated area in southern and northern Ontario. In this work, inspections were made in every part of Ontario. The routine work involved the regular inspections of water supplies and sewage disposal plants throughout the province, stream and pollution surveys and inspections of industrial waste discharges of canning factories, milk plants, gravel washing plants and abattoirs.

Water Works Inspections

There were 1,218 inspections made by the district staff of water treatment plants. This can be compared with a total of 502 for 1960, 815 for 1961 and 1,031 for 1962. The total was made up of 750 municipal plants, 97 industrial, 36 military, 42 institutional and 293 private inspections. Samples totalling 2,256 bacterial, 1,604 chemical and 29 other evaluations were secured during the water works inspections. This can be compared with the 1961 total of 1,855 bacterial and 1,205 chemical samples secured in that year. In 1962, these values were 2,673 and 1,508, respectively.

The number of recorded water works inspection points increased from 489 in 1961 to 567 in 1962, and to 690 in 1963. The yearly inspection objective for the program was three visits for chlorinated municipal supplies and one for systems not requiring disinfection, as well as private and industrial (mines) not having townsites. During 1963, 883 inspections were made of the routine inspection points; this is 71 per cent of the objective of 1,448. The percentage of the objective achieved during 1961 was 54 and in 1962 it was 72.

The ultimate objective for water works inspections was three visits per year for all recorded supplies.

Waste Water Treatment Works

There were 1,434 inspections made during 1963 of waste water treatment works serving municipalities and industry. The number of inspections could be compared with the 1,175 inspections made in 1961 and 1,248 in 1962. A total of 852 bacterial, 1,816 chemical and 20 other samples were obtained while making the inspections. In 1962 these amounts were 961, 2,137 and 17, respectively.

The inspection objective for waste water treatment facilities was three visits a year for municipal sewage treatment plants, one inspection for septic tank facilities and two inspections per year for industrial waste water treatment installations.

Sewage Treatment Plants and Septic Tank Installations

There were 560 inspections of regular sewage treatment plants and septic tank systems. This was 62 per cent of the objective of 901 inspections on the 359 points to be covered. The coverage during 1961 was 40 per cent of the objective on the 277 inspection points. In 1962, it was 60 per cent on 328 points.

Canneries

There were 123 inspections made of canneries or 80 per cent of the objective of two inspections per year on the 77 tabulated canneries. The number of canneries in operation decreased from 82 to 77, indicating a continued trend toward consolidation.

Milk Plants

During 1963, 217 inspections were made of the treatment facilities serving 403 milk plants, representing a coverage of 27 per cent. In 1962, 225 inspections were made.



Meat Process Plants

Sixty-nine inspections were made of the waste water treatment facilities serving 259 meat processing plants. In 1962, 76 inspections were made.

Other Industrial Waste Plants

Miscellaneous waste water treatment facilities serving gravel washing plants and other non-chemical industries were included in the summary covering 1963. During the year, 78 inspections were made of the 74 recorded inspection points. In 1962, 43 inspections were made at 43 points.

Meetings with Municipal Officials

The district engineering staff continued to have more direct contact with water works' and sewage works' officials and personnel, throughout the province. During 1963, there were 33 meetings with public utilities commissions and 70 with municipal councils. In addition, discussions were held with various municipal officials and were duly recorded. In this field, there were 333 discussions with municipal clerks, 345 with various other municipal officials, 66 with consulting engineers and 511 with health officials. This was an important aspect of the activities of the division as it brought a direct contact between local officials and the Commission.

Stream Sanitation Branch

The task of pollution abatement fell largely within the scope of the Stream Sanitation Branch. Forming the basis of the pollution control program in the province, surveys of streams were undertaken to determine whether water quality conformed with the Commission's objectives for surface waters. All sources of polluting material were located and sampled where necessary. Terrestrial herbicides represented the most commonly encountered sources of water pollution.

Information on water quality and pollution was collected and reported to the Commission, municipalities, industries, consulting engineers and others to provide a basis for the development of pollution abatement programs.

To an increasing extent, ground water pollution required the attention of the branch. Solid waste disposals involving municipal refuse, sand-salt stockpiles and industrial materials required continual appraisal for possible effects on ground water resources.

Although the division maintained a comprehensive routine inspection service on known points of pollution, much valuable information was obtained during the course of servicing pollution complaints which originated with the public and other concerned groups.

The Commission's program for sewage works development in municipalities was supervised largely by this branch. Once the district engineering staff located and reported on sources of municipal pollution, concerted effort was directed toward working with municipalities and others in controlling the effects of waste water discharges to streams.

Other important phases of the work involved the county survey program, data handling and the engineering draughting services. Information collected during the course of stream monitorings and surveys was carefully indexed and recorded to permit ready use of the data as required.

Stream and Pollution Surveys

During the year, considerable time was spent in planning alterations and improvements to the existing stream survey program. Accordingly, some effort was to be redirected to the establishment of a water quality monitoring network and studies of the self-purification capacities of streams. The grab sampling survey technique in use was to be replaced to a large degree by these newer programs. Emphasis was to be placed on the quantitative-qualitative aspects of pollution with more attention paid to the total effect than merely the qualitative indicators of water pollution.

The district engineering staff completed 212 stream surveys in 1963. The previous year there were 147, and in 1961 there were 50. The stream and pollution surveys required the collection of 4,146 bacterial samples and 3,647 chemical samples. In 1962 these figures were 3,341 and 2,780, respectively.

There were 72 municipal pollution surveys carried out in 1963, whereas a year ago, 105 were completed. The reduction probably reflected a shifting of the work effort to the county survey program and the increased emphasis on stream surveys.

County Survey Program

Early in the year, the division undertook the responsibility for correlating and expediting this program.

These surveys involved taking inventories of the existing uses and future needs for water, and assessing the extent of available resources for domestic water supply, commercial and industrial needs and waste water disposal. In the latter case, studies of the self-purification capabilities of streams were expected to become increasingly important.

In co-operation with the divisions of Laboratories and Water Resources, four reports were prepared, three of which were published. The District of Sudbury and the counties of Carleton, Peel and Norfolk were surveyed. The report on the County of Norfolk was to be published early in 1964.

This program involved about a total of 15 field staff which contributed an estimated 420 man days or 1.7 man years (approximately 0.45 man years per survey). Typing required 170 typist days or somewhat more than two months per survey per typist.



Draughting Services

Five draughtsmen were actively employed in the preparation of watershed maps, plans, graphs and other assignments which complemented the pollution abatement program. Services were performed for other Commission divisions, including work on brochures for official openings of OWRC-municipal projects, on displays for OWRC exhibits and other Commission public relations programs. The regular work included completion of the following projects: 175 plans for municipal pollution surveys, 68 watershed plans and tracings, 243 graphs and diagrams and four projects. Fifty of the watershed plans completed were prepared for the Surface Water Branch' water permit program. Eighty-two watershed plans were available for the work of the Division of Sanitary Engineering.

Plumbing Branch

On January 21st, a Supervisor of Plumbing was appointed in the division. Although the new branch remained a one-man department during the year, it had excellent direction and capable secretarial support. Two committees were formed which were working actively

on some revisions to the plumbing regulations.

Better plumbing inspection and control was actively promoted through meetings, which included inspectors zone meetings, council meetings and conventions. Liaison between the OWRC and the Canadian Standards Association was improved to take a more active part in the control of manufacturing standards for plumbing materials.

Some time was spent in the conciliation of plumbing disputes and also in the checking of plumbing and heating design submitted to the Design Approvals Branch of the division. A survey of municipal plumbing controls was being conducted through the mails and was nearing completion as the year ended.

Water Works and Sewage Works Operators' Courses

One school for Ontario water works operators was held during the year, a repeat of the senior course and 41 were in attendance. At the conclusion of the course, certificates were issued to those operators who successfully passed the examinations on all three courses.

There were three courses for sewage works operators. The first was the Senior Sewage Works Operators' Course with 72 in attendance, the second was a repeat of the senior course with 48 in attendance, and the third course consisted of a Basic Sewage Works Operators' Course with 96 in attendance. Certificates were issued by the Commission to successful candidates in the senior courses.

Review of Subdivisions

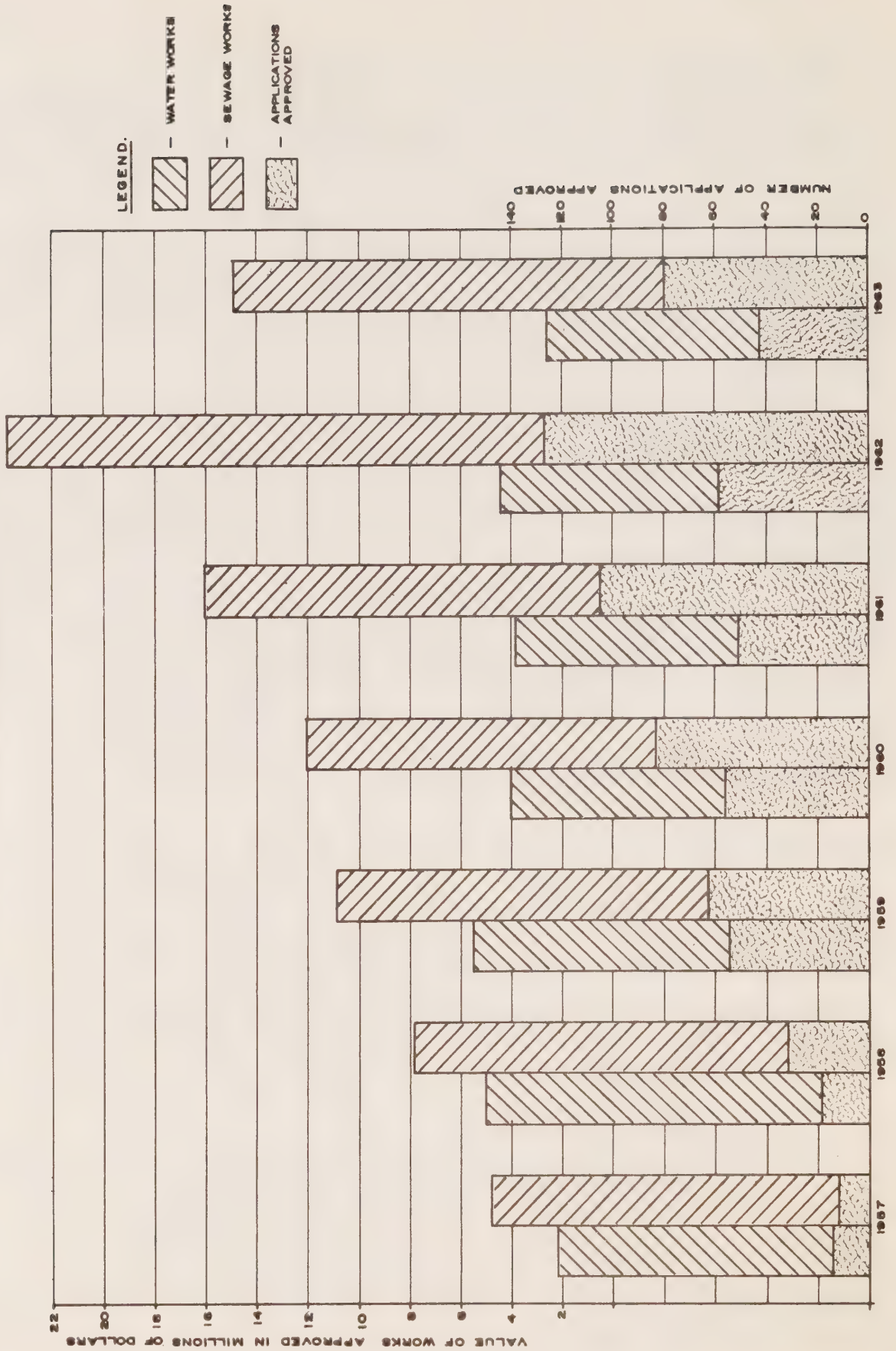
The division worked in close co-operation with the Department of Municipal Affairs (Community Planning Branch) in review of subdivisions submitted for approval. During 1963, 478 plans of subdivisions were submitted for review. On occasion, inspections of special problems were made in the field to assist in determining the course of action to be followed in reporting OWRC opinion of the water supply, sewage disposal and other features of the subdivision.

In addition, plans showing amendments to existing zoning in municipalities of Ontario also were submitted for review. During the year, 30 area plans were reviewed.

Design Approvals Branch

This branch of the division was responsible for the evaluation of plans and specifications submitted for the approval of the Commission for the installation of water works, sewage works and industrial waste works. No such projects could proceed prior to such evaluation and issuance by the branch of a Certificate of Approval. This branch work included preliminary and final design reviews of proposed works, technical assistance in the design of installations, assistance in the planning of services for new developments and examination of engineering reports.

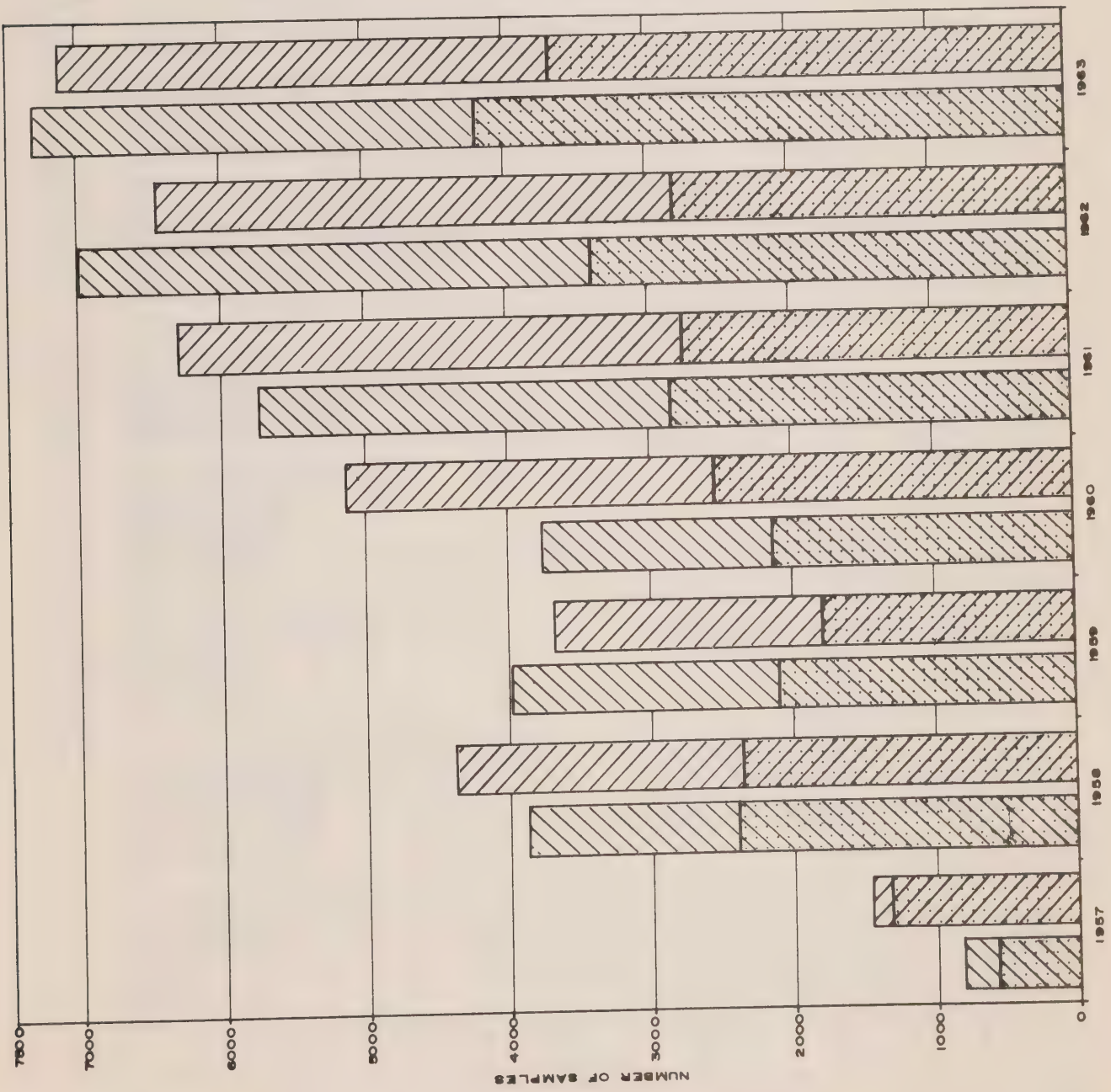
DIVISION OF SANITARY ENGINEERING - DESIGN APPROVALS BRANCH
SUMMARY OF WATER WORKS AND SEWAGE WORKS APPROVALS
FOR OWRC. PROJECTS



DIVISION OF SANITARY ENGINEERING

SAMPLING PROGRAMMES

WATER - SEWAGE - STREAMS
1957 - 1963



LEGEND:

WATER AND SEWAGE SAMPLES
PROGRAM

STREAM SAMPLES PROGRAM

BACTERIAL

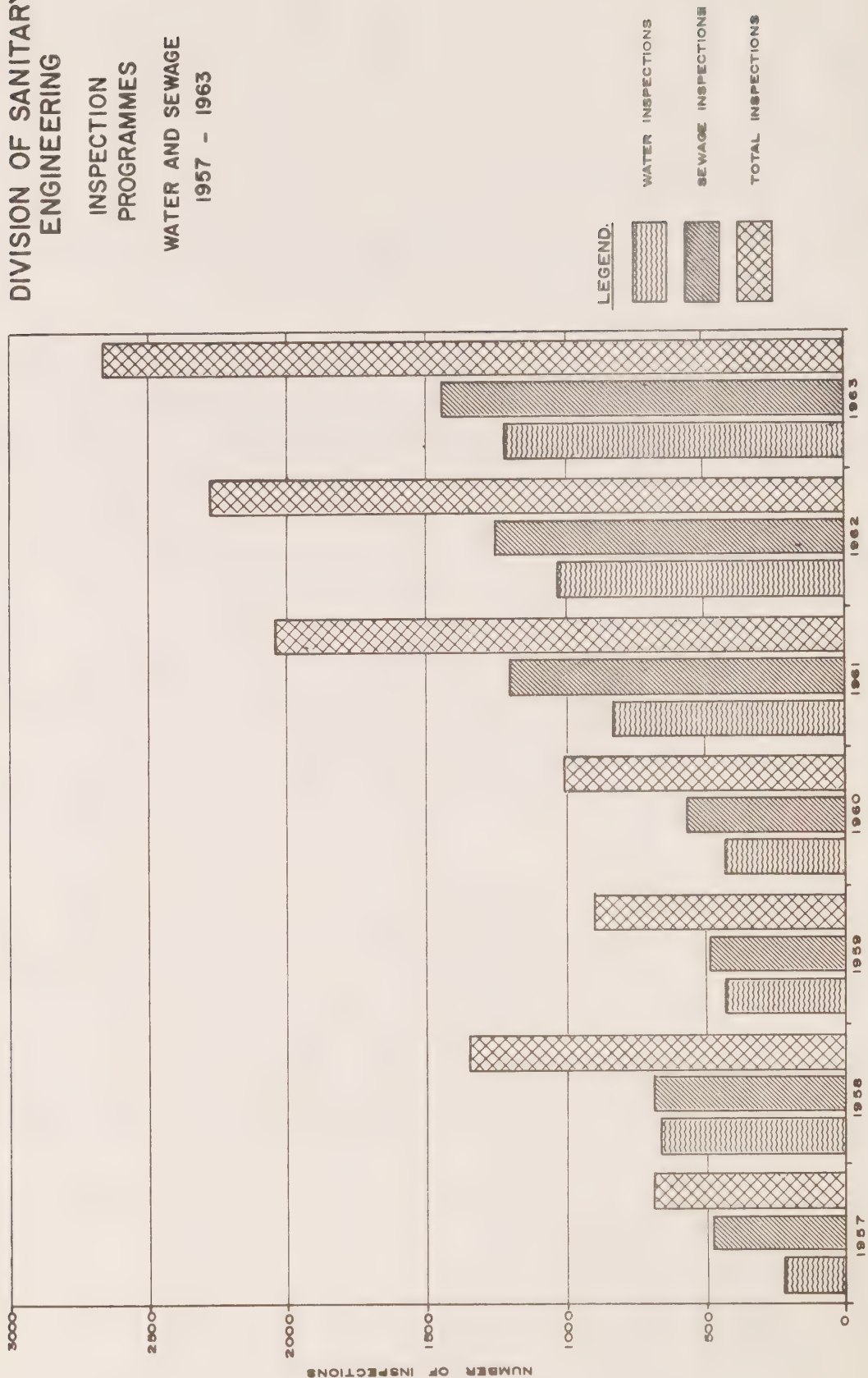
CHEMICAL

TOTAL PROGRAM SAMPLES

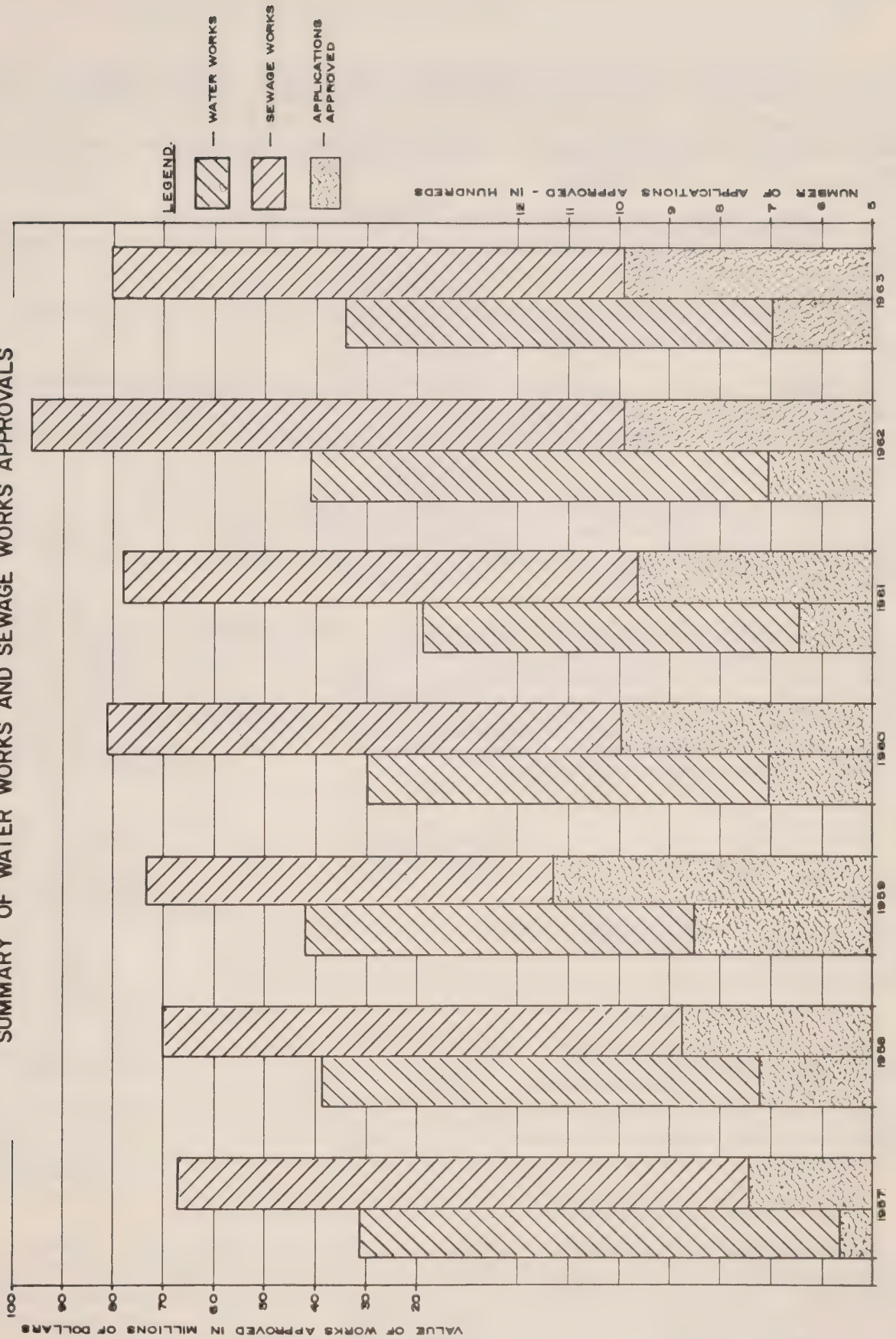
DIVISION OF SANITARY ENGINEERING

INSPECTION PROGRAMMES

WATER AND SEWAGE
1957 - 1963



DIVISION OF SANITARY ENGINEERING - DESIGN APPROVALS BRANCH
SUMMARY OF WATER WORKS AND SEWAGE WORKS APPROVALS



An important part of the Design Approvals Branch was the statistical section which recorded valuable data. Such information included operating data of water and sewage treatment plants, records of treatment efficiency, cost data, laboratory analyses and other data.

During 1963, a Certificate of Approval was issued for each of 1,686 proposed sewage and water works which had a total estimated value of \$114,923,471.57.

The 1962 figures revealed 1,692 certificates and estimated expenditures totalling \$147,754,376.81.

Certificates issued for water works installations totalled 698 and called for an estimated expenditure of \$33,456,802.65. This compared with 704 certificates and an expenditure of \$51,643,155.53 in 1962.

In the sewage works field, 988 certificates were issued during the year calling for an expenditure of \$81,466,668.92 in 1963. This compared with 988 certificates calling for an expenditure of \$96,111,221.28 in 1962.

The decrease in water and sewage works expenditures estimated in 1963 possibly could be attributed, in part, to the Municipal Works Assistance Program which was planned by the federal government and resulted in municipalities delaying possible expenditures until the benefits were fully explained. Also, the 1962 figures, which reached an all-time high, were enhanced by the inclusion of several multi-million-dollar projects.

S U M M A R Y

<u>Re: Water Works</u>	<u>Estimated Cost</u>
Extensions to existing systems.....	\$27,746,749.77
Supply and purification.....	4,701,609.97
New Systems.....	1,008,442.91
Total	\$33,456,802.65
 <u>Re: Sewage Works</u>	 <u>Estimated Cost</u>
Extensions to existing systems.....	\$71,250,725.67
Treatment and disposal works.....	7,772,862.00
New Systems.....	2,443,081.25
Total	\$81,466,668.92

Applications favorably reported upon for water and sewage works totalled 1,686 and involved an estimated expenditure of \$114,923,471.57. Of this total, OWRC projects totalled 121 with expenditures estimated at \$17,068,825.30. In 1962, comparative totals were 185 and \$27,436,297.98, or 18.6 per cent of the total. The 1963 OWRC percentage was 14.8.

CERTIFICATES ISSUED RE WATER WORKS FOR THE YEAR 1963

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New Systems
Acton	1	10,560.00		
Ajax	1	24,808.00		
Alexandria	1	2,996.75		
Almonte	2	23,587.69		
x-Amherstburg	1	154,100.00		
x-Anson, Hindon & Minden	3	8,720.00		145,800.00
Atikokan Twp.	1	6,000.00		
Aurora	1	35,000.00		
Aylmer	1	1,000.00		
Barrie	6	71,311.76		
Beamsville	1	1,290.00		
Belleville	7	315,590.70		
<u>Belleville</u> (B.E.P. Construction Co. Limited).....	1	11,567.41		
(Belleville L. & M. Development Ltd.)	1	30,648.20		
(Kaiser Poultry Ranch Limited).....	1	25,104.63		
(Kelbar Development Limited).....	1	18,702.55		
(M.H. Rollins Con- struction Ltd.)...	1	29,152.59		
Bertie Twp.	1	7,175.00		
<u>Bosanguet Twp.</u> (Mr. George Dzisick, Sarnia)	1		6,270.00	
Bowmanville	5	46,039.45		
Blenheim	1	9,100.00		
Bracebridge	1		23,000.00	
Brampton	2	157,508.65		
x-Brampton	2		68,564.00	
x-Brampton	1		144,000.00	
Brantford	11	553,104.38		
Brantford Twp.	4	55,185.00		
Bridgeport	1	130,365.00		
Brockville	4	327,330.00		
Burlington	9	153,145.41	526,800.00	
x-Cache Bay	1			134,910.00
Calvert Twp.	1			22,913.00
Campbellford	1		215,000.00	
Capreol	1	12,029.80		
Chapleau Twp.	1	32,069.00		

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New Systems
Chatham	4	76,898.00		
Chatham Twp.	1	4,323.10		
Chelmsford	1	6,850.00		
Chesley	1	1,090.00		
Chesterville	1	512.00		
Chinguacousy Twp.	4	249,312.30		
x-Clarke Twp.(P.V. of Orono)	1			7174,014.16
Clinton	1	5,446.15		
Clinton Twp.(P.V.of Vineland).....	1	684.00		
Cobourg	1	15,306.50		
Cochrane	1	19,853.00		
Colborne	1	10,800.00	12,000.00	
Collingwood Twp. (Mr.W.B.Loft)	1			11,582.00
Cornwall	9	334,960.78		
Creemore	1		3,250.00	
Crystal Beach	1		23,130.00	
Cumberland Twp.	2	224,220.00	5,000.00	
Delhi	3	2,983.15	178,924.00	
Delhi	1		75,000.00	
Delhi (Mr. Julia Callens)	1	7,838.17		
Dereham Twp.	1	22,050.00		
Dorchester N.Twp. (Mr. James Lind)	1	5,800.00		
Dryden	2	14,485.08	2,250.00	
Dundas	1	23,000.00		
Dunwich Twp. (Ont.Department of Highways).....	1	101,000.00		
Durham	1	1,797.69		
x-Eganville	1	713,500.00		
Elmira	2	14,000.00		
Elmvale	1	6,050.00		
Ernestown Twp.	1		25,000.00	
Etobicoke Twp.	34	1,000,535.03		
Exeter	3	20,870.57	1,192.00	
x-Fauquier Twp. (Moonbeam Townsite)	1			94,740.00
Fenelon Falls	2	11,598.79		
Fergus	2	31,525.00		
Ferris West Twp.	2	14,597.70		
Firstbrook Twp. (unorganized)....	1		7,500.00	
(Trans Canada Pipe Ltd., Toronto)				

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New Systems
Fonthill	1	6,784.00		
Forest	1		1,000.00	
Fort Erie	4	15,379.50	36,500.00	
Fort Frances	1	249,630.50		
Fort Frances	1	55,000.00		
x-Frankford	1	25,564.00		
x-Frankford	1	15,817.50		
Galt	3	148,682.00		
Gananoque	1	4,200.00		
Georgetown	1	16,100.00		
Georgina Twp.	1	1,052.10		
x-Gerladton	2	129,000.00		
Glencoe	2	4,932.27		
Gloucester Twp.	3	22,490.35		
Gore Bay	1		37,300.00	
Gosfield N. Twp.	1	28,187.00		
Goulbourn Twp.				
(Conarm Develop- ments Ltd.).....	1			154,457.91
Guelph	1		20,000.00	
Guelph Twp. (Ontario Dept. of P. Wks.)	1	77,000.00		
Gwillimbury N. Twp.				
(Mr. Gordon Clark, Keswick).....	1		40,943.70	
Hagersville	1	11,720.00		
Haldiman Twp.				
(Trans Canada Pipe Lines Ltd.).....	1		7,000.00	
Hamilton	39	738,350.00		
Harrow	1	3,500.00		
Hawkesbury	1	16,607.00		
Hawkesbury				
(Canadian Inter- national Paper Co.)	1	5,400.00		
Hensall	1	1,000.00		
Howick Twp.	1		5,104.00	
Ingersoll	1	30,080.00		
Iroquois (H. E. P. C.)	1		10,000.00	
Kapuskasing	1	11,000.00		
Kemptville	1	4,800.00		
Kenora	1	9,655.75		
King Twp.	2	38,300.00	61,800.00	

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New Systems
Kingston	6	276,804.00		
Kingston Twp.	4	89,691.67		
Kitchener	3	660,637.00		
Laxton & Longford Tps. (Norland).....	1	348.00		
Leamington	1	4,460.00		
Leaside	4	178,700.00		
Lindsay	2	25,249.58		
Listowel	1	676.25		
Little Current	1	2,700.00		
London	10	1,956,493.00	1,085,000.00	
<u>London</u> (Bernado-Hoffman Limited).....	1	15,920.00		
(Huron-Clarke Develop- ment).....	1	89,442.91		
(Eadie & Willcock Limited).....	1	7,922.00		
(Sherwood Forest Development Co.)	1	6,445.00		
(Mr. Paul Shymkiw)	1	760.00		
(H.S. Smith Construc- tion Company)....	1	16,036.00		
(Upper Thames Develop- ment Limited)....	1	4,455.00		
<u>Longlac I.D.</u> (Kimberly-Clark Pulp & Paper Company)	1	50,621.00		
x-Louth Twp.	3			234,200.00
Maidstone Twp.	1	75,282.00		
Malden Twp.	1	10,283.00		
Manitouwadge I.D.	1	39,000.00		
Marathon I.D.	1		37,250.00	
Markham	1	72,051.00		
Markham Twp.	6	236,441.00		
x-Markham Twp.	3	5,349.000	169,150.00	
Merrickville	1	2,500.00		
Mersea Twp.	1	41,548.00		
Midland	1		6,494.02	
Milton	1	7,564.10		
Moore Twp. (P.V. of Corunna).....	2	15,080.61		
Morrisburg (H.E.P.C.)	1		14,000.00	
Mount Forest	1		5,300.00	
<u>Murray Twp.</u> (B.A. Oil Co.)...	1		11,517.00	

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New System
McDougall Twp.	3	82,411.20	44,500.00	
x-Neelon & Garson Twps.	1	112,000.00		
Nepean Twp.	2	418,232.39		
Nepean Twp. (Campeau Construct. Company Ltd.)....	2	143,901.00		
Newcastle	1	6,616.00		
x-Newcastle	2	14,606.50		
Newmarket	1	15,215.00		
New Hamburg	1		20,600.00	
New Liskeard	1	4,750.00		
Niagara Falls	6	86,592.59		
Niagara Twp.	3	149,227.34		
Niagara Twp. (Jockey Club Ltd., Downsview).....	1	62,000.00		
North Bay	1	23,683.00		
Norwich South Twp. (P.V. of Otterville)	1	8,429.00		
Oakville	5	106,388.50		
Orangeville	1	25,400.00		
Orillia	2	8,622.44		
Orillia Twp.	5	49,753.90		
Oshawa	10	166,972.51		
Oshawa (Holshaw Limited)	1	17,955.00		
Ottawa	19	725,897.00		
Owen Sound	2	5,420.67		
Paris	1	42,000.00		
Parkhill	1	10,000.00		
x-Pelham Twp.	1			7256,600.00
Pembroke	1	69,365.41		
Penetanguishene	2	9,700.00		
Perth	4	10,203.00	620,000.00	
Peterborough	8	966,886.70		
Pickering Twp.	4	129,265.00		
Picton	1		17,000.00	
Pinard Twp. unorganized (H.E.P.C.).....	1		77,000.00	
Pittsburgh Twp. (Federal Dept. of Justice, Ottawa)	1		85,000.00	
x-Pittsburgh Twp. (Cartwright Point)	1			718,130.00

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New Systems
Point Edward	2	12,750.00		
x-Point Edward	1		492,500.00	
Port Arthur	6	195,829.00		
x-Port Burwell	1			214,750.00
Port Hope	1	7,300.00		
Port Perry	1	3,851.00		
Port Rowan	4	17,702.17	45,536.00	
Port Stanley	1	20,000.00		
Prescott	1		5,850.00	
Preston	1	18,550.00	8,380.00	
<u>Rama Twp. (National Council, Y.M.C.A.)</u>	1		4,500.00	
Red Rock I.D.	1	6,360.00		
Richmond Hill	1	12,600.00		
x-Richmond Hill	2	30,500.00	81,409.25	
Ridgetown	1	3,363.43		
Riverside	1	7,077.00		
Rochester Twp.	2	11,078.00		
Rockcliffe Park	1	2,664.00		
Romney Twp.	1	4,076.00		
St. Clair Beach	2	2,000.00		
St. Thomas	2	27,079.50		
St. Vincent Twp.	1	5,925.00		
Saltfleet Twp.	2	87,285.21		
x-Saltfleet Twp.	4	174,498.90		
<u>Saltfleet Twp.</u> (Mathers Construction Co. Limited).....	1	16,910.00		
Sandwich West Twp.	5	34,050.00		
Sarnia	4	194,000.00		
Sault Ste. Marie	2	12,840.00		
x-Sault Ste. Marie	2	675,000.00		
<u>Sault Ste. Marie</u> (Five Cities Develop- ment Limited)....	1	10,522.00		
S(Rosewall Holdings Limited).....	1	7,224.00		
Scarborough Twp.	34	928,227.30		
Sioux Lookout	4	28,550.00	7,350.00	
Smiths Falls	2	80,715.00		
<u>Smiths Falls</u> (A.G. Andrews Ltd.)	1	8,400.00		
<u>Sombra Twp.</u> (Mr. D. Lea).....	1		9,000.00	
Stafford Twp.	3	29,977.65		
<u>Stanley Twp.</u> (Mr. N.E. Smith)....	1		7,200.00	

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New Systems
Stirling	1	2,547.20		
Stratford	6	414,432.00	145,500.00	
Streetsville	1		7,957.00	
Sturgeon Falls	1	9,580.00		
<u>Sturgeon Falls</u>				
(Riverview Development Sturgeon Falls Ltd.)	1	8,129.81		
Sudbury	9	419,932.00		
<u>Sudbury</u>				
(Sudbury Industrial Parks Ltd.)	1	15,129.10		
(Laurentian Univer)	1	55,000.00		
(Barco Developments Limited)	1	25,924.00		
(Destor Investments Limited)	1	14,060.00		
<u>Tarentorus Twp.</u>				
(Hollingsworth Invest- ments Limited)	1	80,110.00		
Tay Twp.	1	1,650.00		
<u>Tay Twp.</u>				
(Portage Park Estates)			18,200.00	
.....	1			
Thessalon	1			208,505.00
x-Thorah Twp.	2	89,670.00		
Thornbury	2	23,719.50		
Thorold Twp.	1	7,615.00		
<u>Thorold Twp.</u>				
(St. Catharines Estates Limited)	1	29,386.00		
Tilbury	2	15,250.00		
<u>Tilbury East Twp.</u>				
(Ont. Dept. of Highways)	1	45,000.00		
Tilbury North Twp.	1	8,191.00		
Tillsonburg	2	7,785.00	97,524.00	
Timmins	1	26,090.00		
Tisdale Twp.	1	2,172.00		
<u>Tisdale Twp.</u>				
(Mr. Ned Bragagnolo)	1	4,500.00		
Toronto	7	522,599.00		
Toronto Metro	6	6,760,000.00	150,000.00	
Toronto Twp.	27	1,086,001.77		
<u>Toronto Twp.</u>				
(Bengot Holdings Ltd.)		69,820.00		
(Jaguar Home Builders Limited)	1	14,209.80		
(Mr. J. Neate)	1	3,627.75		
Trenton	1	83,855.30		
Tuckersmith Twp.	1		9,000.00	

WATER WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Supply and Purification	New System
Uxbridge	3	8,036.50	78,760.00	
Vaughan Twp.	5	395,700.00	174,000.00	
Victoria Harbour	1	7,500.00		
Walkerton	2		48,000.00	
Wallaceburg	2	11,250.00		
Waterford	1	4,584.00		
Waterloo	3	277,000.00		
Watford	1	8,260.00		
Welland	2	22,000.00		
x-Wellington	1	11,000.00		
Westminster Twp. (P.V. of Lamberth)	1		107,430.00	
Weston	1	22,400.00		
Wheatley	2	1,404.00	140,185.00	
Whitby	2	47,080.00		
Whitby Twp.	1	1,808.00		
x-Whitchurch Twp.	1			130,000.00
Wicksteed Twp.	2		750.00	319,400.00
Widdifield Twp.	2	14,552.00		
x-Widdifield Twp.	1	29,260.00		
Widdifield Twp. (Camelot Homes Ltd.)..	1	32,490.00		
Windsor	2	118,817.78		
Windsor (Hiram Walker & Sons)	1	4,000.00		
Woodstock	2	2,168.00	123,500.00	
Woodstock (Springbank Homesites Limited).....	1	30,000.00		
x-Woolwich Twp. (P.V. of St. Jacobs).....	1			178,000.00
York Twp.	2	42,500.00		
York East Twp.	2	26,930.00		
York North Twp.	43	988,773.28		
TOTALS	698	27,746,749.77	4,701,609.97	1,008,442.91

x- OWRC project

/ preliminary approval only - included in total number of
certificates not included in
total estimates

CERTIFICATES ISSUED RE SEWAGE WORKS FOR THE YEAR 1963

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
Ajax	1	5,004.00		
Albion Twp.	1		8,000.00	
Alliston	1		85,000.00	
Algonquin Park (Ontario Department of Public Works)....	1		35,000.00	
Almonte	2	20,804.66		
Amherstburg, Anderdon and Malden.....	1	563,107.00	303,239.00	
Arnprior	1	157,536.93		
Aurora	1	52,500.00		
Aylmer	4	21,600.00		
Barrie	9	153,546.72		
Beamsville	1	1,180.00		
Belleville	10	461,412.60		
Belleville (Maurice Rollins Construction).....	1	13,028.00		
(Barkel Developments Limited).....	1	19,541.00		
x-Black River Twp.	1			458,100.00
x-Blenheim	1			4375,000.00
Bowmanville	5	73,211.28		
Bradford	1	74,640.00		
x-Bradford	1	25,400.00		
Brampton	7	539,426.76		
x-Brampton and Chingua- cousy Twp.....	1		41,450,000.00	
Brantford	11	1,006,620.00		
Bridgeport	1	93,300.00		
Brockville	3	219,990.00	665,000.00	
Burlington	17	582,388.70		
x-Burlington	7	1,499,000.00		
Capreol Twp.	1			250,000.00
Chapleau Twp.	1	20,660.00		
Chatham	10	1,569,680.00	1,700,000.00	
x-Chelmsford	2	21,500.--		
x-Chesley	1	1,814.00		
Chinguacousy Twp.	4	603,027.00		
Chippawa	1	125,635.00		

SEWAGE WORKS CERTIFICATES

(Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
Clinton	1	4,520.10		
Clinton Twp. (Ont. Department of Public Works.....	1			68,000.00
Cobourg	6	293,287.51		
Cochrane	1	73,370.00		
x-Colborne	1			230,000.00
Collingwood	1	42,700.00		
Cornwall	4	63,096.49		
Delhi	2	3,635.25		
Delhi (Mr. Julia Callens)..	1	6,305.01		
Dryden	2	61,895.45		
Dumfries North Twp. (Farmer's Allied Meat Enterprises Co- operative Ltd.).....	1		250,000.00	
Dundas	2	173,622.00		
Eastview	2	982,150.00		
Elmira	1	11,150.00		
x-Elmira	1		458,000.00	
x-Elora	1			368,389.00
x-Essex	1			185,220.00
Etobicoke Twp.	96	5,268,076.54		
Exeter	1	16,098.33		
x-Exeter	1	12,300.00		
x-Fauquier Twp.	1			98,305.00
Fergus	1	19,862.00		
Ferris West Twp. (Mr. Ken Saunders, North Bay)	1	10,801.95		
Fort Erie	3	197,004.85		
Fort Frances	2	35,379.00		
x-Fort Frances	1	1,276,250.00	768,750.00	
Fort William	4	90,211.45		
Fort William (Headway Builders Limited).....	1	59,400.00		
x-Frankford	1	62,813.00		
x-Frankford	1	24,489.00		

SEWAGE WORKS CERTIFICATES

(Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
<u>Gainsborough Twp.</u>				
(Mr. R. Kingma).....	1		6,000.00	
Galt	3	107,000.00		
Gananoque	1	2,968.00		
Georgina Twp.(Ont. Dept. of Public Works)	1		56,000.00	
Goderich	2	11,485.00		
<u>Goulbourn Twp.</u>				
(Conarm Develop- ments Ltd.).....	2	305,558.79		
Grimsby N. Twp.	3	37,964.43		
Gwillimbury E. Twp.	1	31,497.84		
Hagersville	2	41,000.00	125,000.00	
Hamilton	12	4,500,750.00		
<u>Hamilton</u>				
(Abbotsford Prop- erties Limited)....	1	2,200.00		
(Di Cenzo Con- struction Co.).....	1	25,450.00		
(Dominion Foundries & Steel Limited).....	1	158,030.41		
(Dundurn Construc- tion Company Ltd.).	1	80,540.00		
(Fennell Develop- ments Limited).....	1	9,040.00		
(Grisenthwaite Con- struction Co. Ltd.).	1	25,573.00		
(Mr. Bruce L. Hunt)..	1	3,792.00		
(Mr. Samuel Koza)....	1	4,650.00		
(Queenston Develop- ment Co. Ltd.).....	1	44,465.00		
(Frank Rubenstein Ltd., Frank Husak Ltd, and Max Ritz Ltd.).....	1	38,950.00		
(Seebeck Construction Company Ltd.).....	1	7,780.00		
(Pendevco Develop- ment Co. Limited)...	2	66,200.00		
(Steinnogel Construc- tion Limited)	1	9,510.00		

SEWAGE WORKS CERTIFICATES

(Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
(Sunshine Homes Ltd.)	1	43,581.00		
(Wil-Bar Develop- ments Ltd.)	1	31,050.00		
Hanover	1		209,313.00	
Hawkesbury	1	28,231.00		
x-Hawkesbury	1		7594,000.00	
<u>Hawkesbury</u> (Canadian Inter- national Paper Company).....	1	4,000.00		
<u>Howick Twp.</u> (Public School Board	1		19,000.00	
Ingersoll	1	738,500.00		
Kapuskasing	1	15,000.00		
Kemptville	1	7,350.00		
Kenyon Twp.	1	2,004.50		
x-Kincardine	1			484,140.00
King Twp.(Ontario Dept. of Public Works	1		127,000.00	
Kingston	9	438,578.45		
Kingston Twp.	1	112,880.00		
x-Kingsville	1			7384,825.00
Kitchener	6	249,866.84		
Korah Twp.	1	157,000.00		
x-Korah Twp.	1	150,409.00		
x-Lakefield	1			7282,000.00
Leamington	4	11,659.26		
Leaside	4	89,000.00		
Levack	1	3,500.00		
x-Levack	1	752,700.00	7240,000.00	
Lindsay	2	77,340.00		
<u>Lindsay</u> (D.J. Warner Co. Ltd).....	1	8,941.00		
x-Listowel	1	3,680.00		
x-Little Current	1			7216,500.00
London	15	620,534.71	625,000.00	
<u>London</u> (Bernardo-Hoffman)..	1	50,752.00		
(Clarkside Corp. Ltd.).....	1	180,100.00		

SEWAGE WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
(Donald V. Crich)...	2	12,400.00		
(Eadie & Willcock Lt.)	1	26,600.00		
(Medway Construction Company).....	2	169,239.39		
(Mr. Paul Shymkiw...	1	3,150.00		
(Sunrise Develop- ment Limited).....	1	241,949.00		
(Upper Thames Devel- opment Limited)....	1	12,221.00		
(Huron-Clarke Devel- opment).....	1	327,275.76		
(Harry A. Smith Con- struction Co. Ltd.	1	62,067.00		
Long Branch	1	4,500.00		
Longlac I.D.	1	68,395.00		
x-L'Orignal	1			/164,500.00
x-Lucan	1			/118,900.00
Manitouwadge I.D.	1	52,000.00		
Markham	2	17,550.00		
<u>Markham</u> (Gladiator Devel- opments Ltd.)	1	208,728.65		
Markham Twp.	1	60,117.05		
x-Mattawa	1	150,828.00	149,902.00	
x-Merrickville	1			/121,800.00
Midland	1	5,900.00		
x-Midland	3	593,300.00	460,000.00	
Mimico	1	1,600.00		
Mitchell	2	168,044.57		
x-Moore Twp.	1	/30,060.00		
Morrisburg	1	34,000.00	6,000.00	
x-Mountjoy Twp.	1			/288,800.00
Mount Forest	1		8,000.00	
<u>Murray Twp.</u> (B.A. Oil Company)..	1		19,288.00	
<u>Muskoka Twp.</u> (Muskoka Sands Inn Ltd., Gravenhurst)	1		21,850.00	
Nepean Twp.	7	519,232.22		
x-Nepean Twp.	1	1,092.00		
Nepean Twp. (Campeau Con.Co.Ltd.	1	168,488.00		

SEWAGE WORKS CERTIFICATES

(Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
x-New Hamburg	1	7,000.00		
Newmarket	7	100,051.00		
Newmarket				
(Mr. E. Sokol).....	1	10,390.00		
x-New Liskeard	1	175,520.00	114,480.00	
x-Niagara	1			345,000.00
Niagara Falls	5	254,477.83		
Niagara Twp.				
(Jockey Club Ltd.)...	1			61,500.00
North Bay	4	355,776.55		
Oakville	9	768,017.03		
Orillia	5	45,168.90		
Orangeville	1	4,535.00		
Oshawa	13	980,677.06		
Oshawa				
(Holshaw Limited)	2	41,995.00		
Ottawa	71	6,193,552.00		
Ottawa-Eastview	1	1,487,000.00		
Owen Sound	2	15,610.38		
x-Owen Sound	1	475,000.00		
Palmerston				
(Ontario Department of Public Works) ...	1		125,000.00	
Paris	4	37,200.00		
x-Paris	1	6,296.84		
Pembroke	1	14,265.75		
Perth	2	11,247.00		
Peterborough	13	409,261.36		
Petrolia	1	146,500.00	188,500.00	
Pickering Twp.	3	15,587.00		
Picton	1		225,000.00	
Pinard Twp. unorgan- ized (H.E.P.C.).....	1	195,000.00	49,000.00	
Port Arthur	4	253,677.00		
x-Port Arthur	2	735,016.00		
x-Port Colborne	2	4,800.00		
Port Credit	1	20,680.00		
x-Port Credit	1	13,664.00		
x-Port Dover	1	223,500.00	372,800.00	
Port Hope	4	24,990.00		
Preston	4	43,663.00		

SEWAGE WORKS CERTIFICATES

(Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
<u>Rama Twp.</u>				
(Y.M.C.A. Nation- al Council).....	1		8,000.00	
Richmond Hill	1	56,500.00		
x-Richmond Hill	1	28,500.00		
Riverside	1	14,306.00		
Riverside & Sand- wich East Twp.....	1	663,646.00	(additional expend. only)	
x-Rockland	1			359,000.00
St. Catharines	9	359,509.00		
x-St. Catharines	1	10,400.00		
<u>St. Catharines</u>				
(St. Catharines Estates Ltd.)	1	41,036.88		
(Fairview Land Devel- opment Limited)	1	34,600.00		
(McKinnon Industries Limited)	1		50,000.00	
St. Thomas	5	87,638.75		
x-Saltfleet Twp.	3	558,117.68		
<u>Saltfleet Twp.</u>				
(Mathers Construc- tion Company).....	1			68,410.00
Sandwich East Twp.	1	1,281.00		
Sandwich West Twp.	1	34,720.00	17,000.00	
Sarnia	5	778,600.00		
Sault Ste. Marie	7	302,865.85		
x-Sault Ste. Marie	1	9,168.00		
<u>Sault Ste. Marie</u>				
(Algoma Steel Cor- poration).....	2	945,000.00	22,100.00	
(Rosewell Holdings Limited)	1	16,589.70		
Scarborough Twp.	46	3,881,297.72		
x-Seaforth	2	22,582.69		
Simcoe	1	19,870.00		
Sioux Lookout	3	102,200.00	13,500.00	
<u>Sioux Lookout (Ont.</u>				
Dept. of Public Works)	1		86,500.00	
Smiths Falls	2	34,885.00		
<u>Smiths Falls</u>				
(A.G. Andrews Ltd.)..	1	6,000.00		

SEWAGE WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
Stafford Twp.	1			205,217.25
Stoney Creek	1	41,685.00		
Stoney Creek and Saltfleet Twp.....	1	13,167.00		
Stratford	6	158,975.00		
Streetsville	2	20,817.00		
Sturgeon Falls	2	14,325.00		
<u>Sturgeon Falls</u> (Riverview Devel- opment Sturgeon Falls Ltd.)	1	13,371.34		
Sudbury	14	1,897,986.22		
<u>Sudbury</u> (Sudbury Industrial Parks Limited).....	1	17,144.20		
(Laurentian Univ.)	1	75,000.00		
x-Sutton	2	3,020.00		308,900.00
x-Sutton	1	12,900.00		
<u>Sutton</u> (Mr. Phillip David- son, Toronto).....	1	2,400.00		
Swansea	1	110,000.00		
Tarentorus Twp.	4	467,349.18		
<u>Teeswater</u> (Teeswater Creamery Limited).....	1		26,000.00	
Terrace Bay	1	7,520.00		
<u>Thessalon</u> (Ont. Department of Public Works).....	1		16,500.00	
x-Thorold	1	225,400.00		
Thorold Twp.	2	20,158.00		
<u>Thorold Twp.</u> (United Steel Cor- poration, Welland)	1		18,000.00	
(St. Catharines Estates Limited)....	1	63,674.00		
Tilbury	1	97,535.00		98,300.00
Tillsonburg	1	90,606.25		
Timmins	1	87,325.00		
Tisdale	1	7,644.00		
Toronto	44	2,441,679.07		
Toronto Twp.	37	3,624,205.20		

SEWAGE WORKS CERTIFICATES (Cont'd)

MUNICIPALITY	No. of Certi- cates	Extensions to Existing Systems	Treatment and Disposal	New Systems
x-Toronto Twp.	2	494,550.00		
<u>Toronto Twp.</u>				
(Jaguar Home Builders Limited).....1		11,020.00		
(Reingold & Wise)....1		5,970.00		
(Mr. J.G. Barron)....1		17,528.00		
(Idlewylde Develop- ments (Ont.) Ltd....1		31,879.00		
(Messrs. George & L.H. Leaver).....,1			15,400.00	
Toronto Metro	8	4,168,470.00		
Trenton	4	204,665.99		
Uxbridge	2	7,864.00	89,250.00	
Wallaceburg	1	17,700.00		
Waterford	1	21,600.00		
Waterloo	9	377,380.00	153,500.00	
<u>Watford (Shippam Imperial Foods Ltd.)</u> 1			46,100.00	
Welland	6	199,783.00		
Welland	3	1,150,000.00		
<u>Westminster Twp.</u>				
(R.C. Diocese of London).....1			36,000.00	
Weston	4	82,184.00		
Whitby	1	78,886.00		
<u>Whitchurch Twp.</u>				
(King Cole Duck Farm Ltd., Aurora)..1			5,000.00	
Whitney Twp.	1	96,300.00		
Wiarton	2	27,222.20		
Widdifield Twp.	7	214,797.00		
Winchester	2	10,650.00		
Windsor	2	95,675.00		
Wingham	1	1,840.00		
x-Wingham	1	195,275.00	47,400.00	
Woodstock	3	132,808.00		
<u>Woodstock</u>				
(Upper Thames River Conservation Auth.) 2		119,240.00		
(Springbank Home- sites Limited)	1	56,330.00		

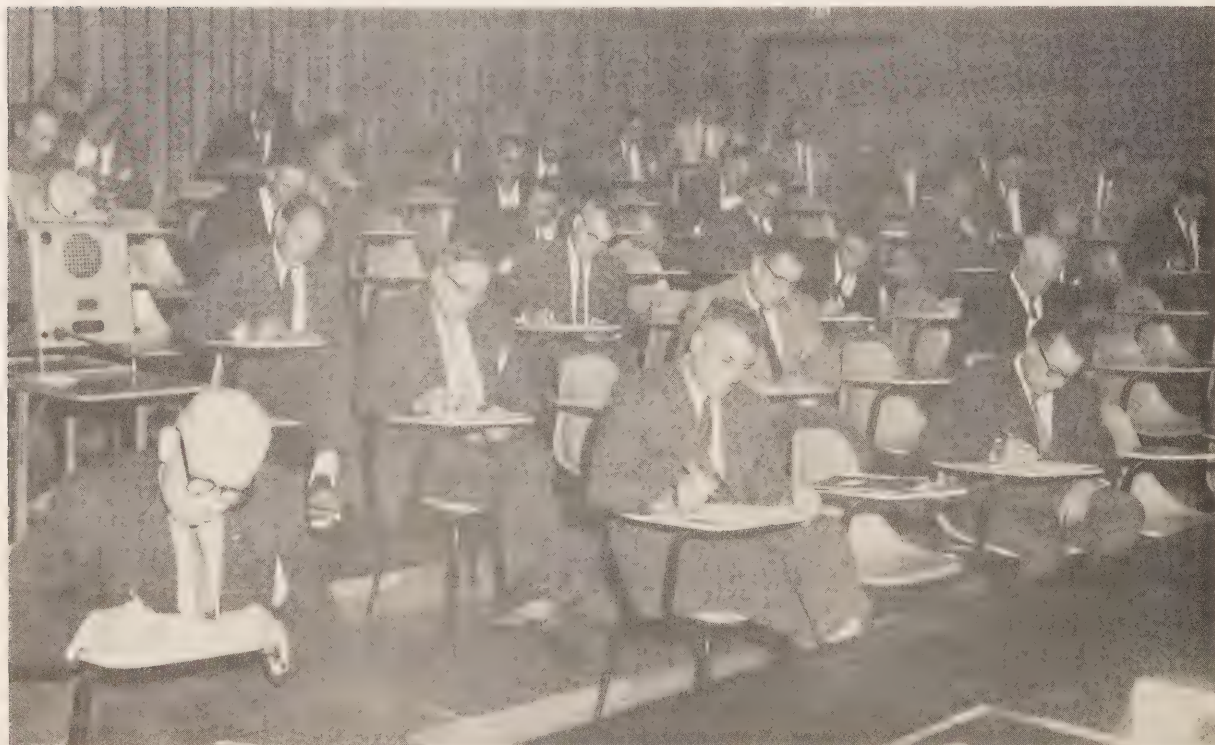
SEWAGE WORKS CERTIFICATES

(Cont'd)

MUNICIPALITY	No. of Certi- ficates	Extensions to Existing Systems	Treatment and Disposal	New Systems
x-Woolwich Twp. (P.V. of St. Jacobs).....	1			/231,240.00
Yonge Twp. Front of (Dept. of Northern Affairs & National Resources, Ottawa)	1		32,690.00	
York Twp.	4	124,575.00		
York East Twp.	6	409,550.00		
York North Twp.	93	5,640,514.60		
TOTALS	988	\$ 71,250,725.67	\$7,772,862.00	\$2,443,081.25

x-OWRC project

/ preliminary approval only - included in total number of
certificates not included in total estimates.



Division of Water Resources

A. K. Watt, Director
K. E. Symons, Assistant Director

During 1963 the Ground Water and Surface Water branches of the Division were engaged in programs of water resources management, water resources surveys, hydrologic data collection, and licensing of drilling and boring contractors.

A staff of 31, two of which were casual, was divided among the various programs at the end of the year as follows:

Administration	6
Water Resources Management (Permit Program)	7
Water Resources Surveys	8
Hydrologic Data	5
Licensing of Well Contractors	5



The water resources management program required a great deal of time early in the year and during the summer period to cope with the hundreds of applications received monthly to take water for irrigation purposes. Revisions were made in both the application and permit forms. The problem of allowing a permittee to take, as needed, varying amounts of water in accordance with its availability was solved by incorporating into the permit a schedule of rates. The rate schedule made possible the degree of flexibility required in the administration of water-taking permits for irrigation purposes. Extra staff was acquired during the summer period to see that permit conditions were being observed. Although 69 field investigations were made following complaints of water-taking interference, no charges were laid or permits cancelled for infractions of the water-taking legislation.

Table 1 contains a summary of the handling of applications and permits during the year. A total of 2,706 permits were issued, six of which were in the form of letters of approval for short-term takings in unspecified amounts. The maximum amount of taking approved under regular permit was 823 million gallons a day. Most of this amount was approved for irrigation taking during the summer period. However, the amount actually used would be substantially less than this because of reduced takings resulting from various meteorological conditions. A comparison of the number of permits issued and amounts of water taking approved for the period 1961 to 1963 is shown in Table 2.

A special study was made of the well-interference problems in the London White Oak well field in an effort to resolve the differences existing between many of the local rural residents and the London Public Utilities Commission. On the basis of recommendations made by the Division, claims in the amount of \$19,274.18 were paid to residents in the area whose wells were affected by the London municipal wells.

A five-year dispute involving the City of Brantford, the Township of Brantford and farmers in the Wyndham Hills area was resolved harmoniously at the end of the year with each of the two municipalities agreeing to assume upon the recommendation of this Commission 50 percent of the costs of the claims made by local farmers. An important aspect of this agreement was the fact that the municipalities had no legal responsibility to assume such costs. It indicated a growing recognition of the responsibility of large water takers in the water management field.

The procedure for preparing county water resources survey reports was revised and the work carried forward through the co-operative efforts of three divisions. The Division of Water Resources assisted in the preparation of reports for the counties of Carleton, Peel and Norfolk and for the District of Sudbury.

The Big Creek river basin survey was submitted to the Agricultural Rehabilitation and Development Branch of the Ontario Department of Agriculture for approval as a project qualifying for federal ARDA

TABLE 1

SUMMARY OF WATER PERMIT DATA

FOR 1963

SOURCE	APPLICATIONS						UNDER CONSIDERATION ON DECEMBER 31, 1963
	CARRIED FORWARD FROM 1962	RECEIVED IN 1963	REFUSED WITHDRAWN OR NOT REQUIRED	APPROVED			
				BY LETTER	BY PERMIT	AMOUNT BY PERMIT (MGD)	
GROUND WATER	35	115	42	5	62	26.7	41
SURFACE WATER	967	1715	20	1	2632*	794.7	34
GROUND AND SURFACE WATER COMBINED	2	15	9	-	6	1.6	2
TOTALS	1004	1845	71	6	2700	823.0	77

* TEN PERMITS WERE ISSUED ON INFORMATION CONTAINED IN 5 APPLICATIONS.

TABLE 2

COMPARISON OF THE NUMBER OF PERMITS ISSUED AND THE
AMOUNTS OF WATER TAKING APPROVED SINCE 1961

	1961		1962		1963	
	NUMBER	AMOUNT (MGD)	NUMBER	AMOUNT (MGD)	NUMBER	AMOUNT (MGD)
<u>GROUND WATER</u>						
APPROVED BY LETTER	1	-	12	-	5	-
APPROVED BY REGULAR PERMIT	19	7.77	68	18.73	62	26.7
<u>SURFACE WATER</u>						
APPROVED BY LETTER	-	-	3	-	1	-
APPROVED BY REGULAR PERMIT	8	9.75	66	15.66	2632	794.7
<u>COMBINED GROUND AND SURFACE SOURCES</u>						
APPROVED BY LETTER	-	-	1	-	-	-
APPROVED BY REGULAR PERMIT	-	-	2	0.95	6	1.6
TOTALS	28	17.5	152	35.34	2706	823.0

support to the extent of 50 per cent of the cost of the project. Approval was not received until mid-summer for the ARDA support making it difficult to obtain staff to assist in the work. A cartographer and geological assistant were employed on a casual basis in November to work on river basin surveys.



Both branches were active in hydrologic studies in 1963. The number of wells used for observation purposes by the Ground Water Branch increased to 56 by the end of the year. The Surface Water Branch assisted in the installation of 10 streamflow gauging stations by the federal government through an installation and maintenance cost-sharing arrangement. A great many additional readings and observations were made by staff of the branch in streams throughout southern Ontario. The hydrologic data obtained were needed in the administration of the water management program as well as in settling disputes involving water-taking interference in situations not covered by OWRC legislation.

Both branches assisted in the preparation of maps showing ground-water conditions, locations of water-interference problems, and main areas of irrigation in southern Ontario.

The division was represented on the Emergency Water Supply Committee set up by the Department of Agriculture to aid rural residents affected by drought conditions in many sections of Ontario. The drought conditions were most severe in the southwestern part of the province.

The division participated in a variety of conferences, meetings and field trips throughout the year. Six papers were presented by members of the staff. Two appearances were made on CBC programs to provide information on division activities and on hydrology of interest primarily to agricultural groups.

GROUND WATER BRANCH

The Ground Water Branch participated in four major programs: water resources management, water resources surveys and investigations, hydrologic data, and well-contractor licensing. Through these programs essential data, advice, and protection were made available to individuals, corporations, and municipalities in many parts of the province. Fewer municipal hydrogeologic surveys were carried out than in the previous year. However, the scope of several of them was broadened to aid in meeting the water needs in areas of increasing demand. There was a sharp increase in the work of investigating well-interference problems and settling claims arising from the interference. There was no increase in the permanent staff of the branch, but one geologist's assistant was employed on a casual basis to aid in a river basin survey. The work carried out under each program is described in more detail below.

Water Resources Management Program

Well Interference Investigations

Twenty-five investigations of reported or anticipated well interference were undertaken. The time required to investigate and report on each problem varied from several hours to several weeks depending on the type of problem and number of individuals involved. The services of one geologist with support from other members of the branch were required to examine the well interference problems.

The investigations were conducted in the following municipalities:

Townships of Blanshard and East Nissouri,
Brantford, Chinguacousy (2), Cumberland,
Delaware, Lobo (including Police Village
of Komoka), Nepean, North Dorchester and
West Nissouri, Puslinch (2), Scarborough,
Toronto, Waterloo (2), West Garafraxa,
Westminster (2), West Zorra, and Whitchurch;

Villages of Cookstown and South River;

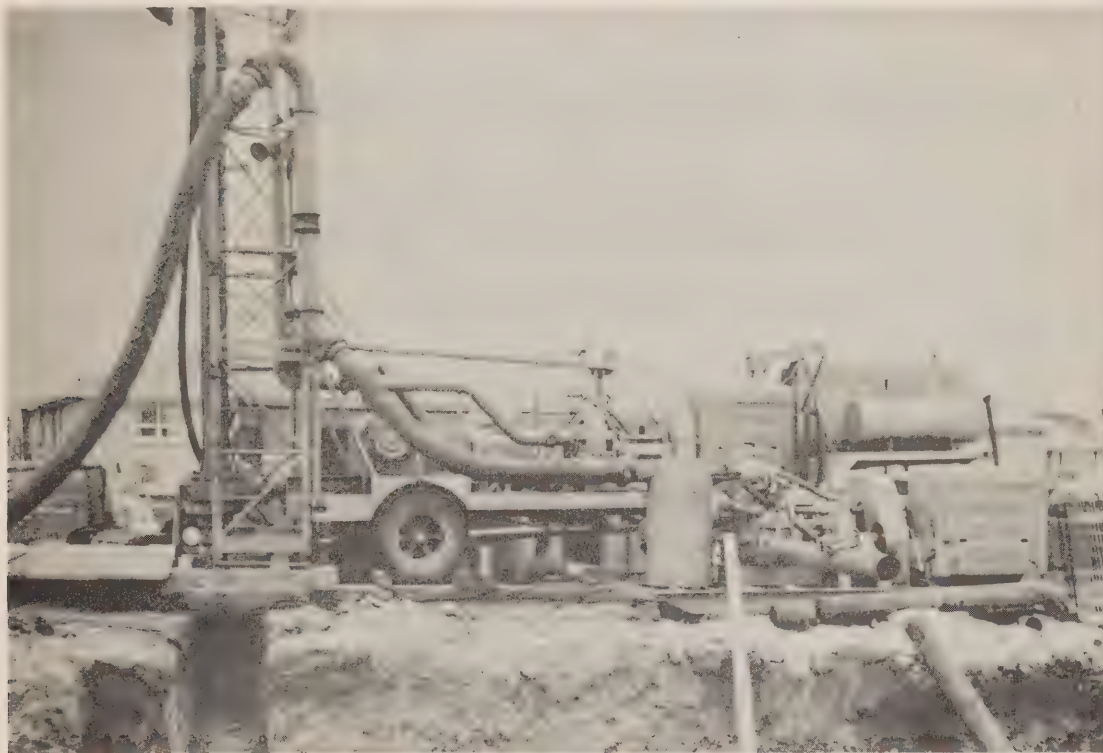
Town of Paris;

Cities of Galt and Sault Ste. Marie

Water Permits

Compared to 1962, there was a slight decrease in the number of permits issued for the taking of water from ground-water sources. Sixty-two permits were issued for the taking of 26,700,000 gallons of water per day. Five short-term takings were approved by letter. Of the 115 applications received, 42 did not require permits. Forty-one applications were under consideration at the end of the year.

Many of these required the submission of additional information by the owner before they could be processed.



Water Resources Surveys and Investigations Program

Water resources surveys and investigations formed a major program of the Ground Water Branch. Three geologists, two regular assistants, and one casual assistant were engaged in this work at the end of the year. Work completed or in progress during the year included 18 hydrogeologic surveys undertaken for municipalities; 10 test-drilling and well-construction projects; and 28 special investigations relating to water supply and waste disposal problems. The branch completed contributions to four county water resources survey reports and a draft of a township water resources survey report. Work was started on a river basin survey and a study of the hydrogeology of the Woodbridge area was undertaken in co-operation with other departments of the provincial and federal governments. Figure 1 shows the work carried out in this program and the water resources management program during the period 1957 to 1963.

Municipal Hydrogeologic Surveys

Reports were issued for hydrogeologic surveys carried out for 14 municipalities, and surveys for four other municipalities were at various stages of completion. The time spent on an investigation and report varied from several days to several months depending on

the nature of the problem and the area investigated. The reports set forth the ground-water conditions of each area and contained recommendations concerning test drilling, well construction, or well yields.

The surveys were done for the following municipalities:

Townships of Ameliasburg (Fenwick Gardens subdivision), East Whitby, and Stafford;

Police Villages of Ancaster, Angus, and Brechin;

Villages of Grand Bend, Stittsville, and Vienna;

Towns of Brampton, Durham, Preston, Trenton, and Uxbridge;

Cities of Cornwall, Kitchener, Midland, and Sault Ste. Marie.

Test-Drilling and Well-Construction Projects

The Branch was active in eight test-drilling and two well-construction projects during the year. This work, which is an extension of municipal hydrogeologic surveys to testing, design, and construction stages, was carried out under agreements between the Commission and the municipalities. By the end of the year, work on six of the projects was essentially completed, test drilling was in progress on another, and tendering was active for three.

The following is a summary of the projects supervised by the branch:

1. Projects continued from 1962:

Test drilling - Township of Gloucester; (Orleans)
Town of Deseronto

Well Construction - Township of Cumberland;
Town of Richmond Hill.

Three satisfactory well sites were located at Orleans, but insufficient water was found at Deseronto.

Good wells were constructed in the Township of Cumberland and at Richmond Hill.

2. Projects initiated or resumed in 1963:

Test drilling - Townships of Chapleau and Emo;
Villages of Bobcaygeon and Havelock;
Towns of Midland and Vankleek Hill

WATER RESOURCES DIVISION
HYDROGEOLOGIC DATA PROGRAM
Ground Water Branch

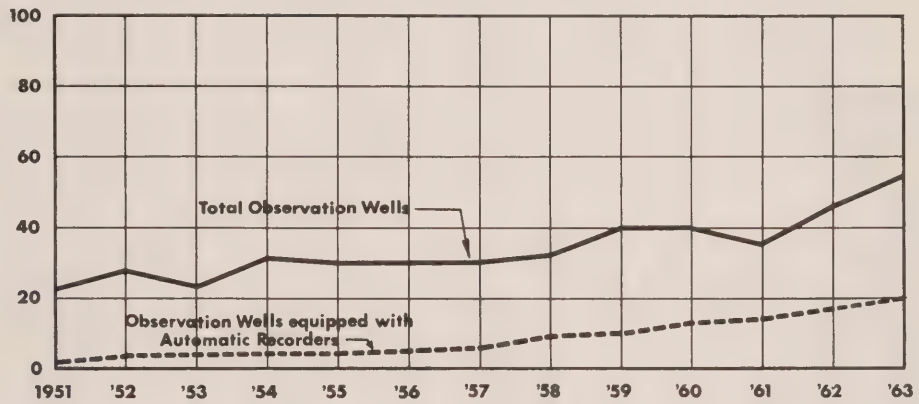


Figure 2 - Number of Observation Wells

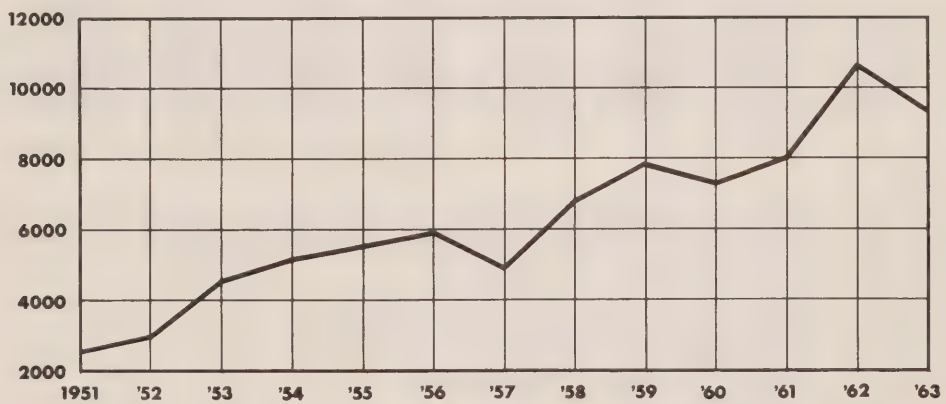


Figure 3 - Number of Water-Well Records Received Annually

WATER RESOURCES DIVISION
WATER MANAGEMENT AND SURVEY PROGRAMS
Ground Water Branch

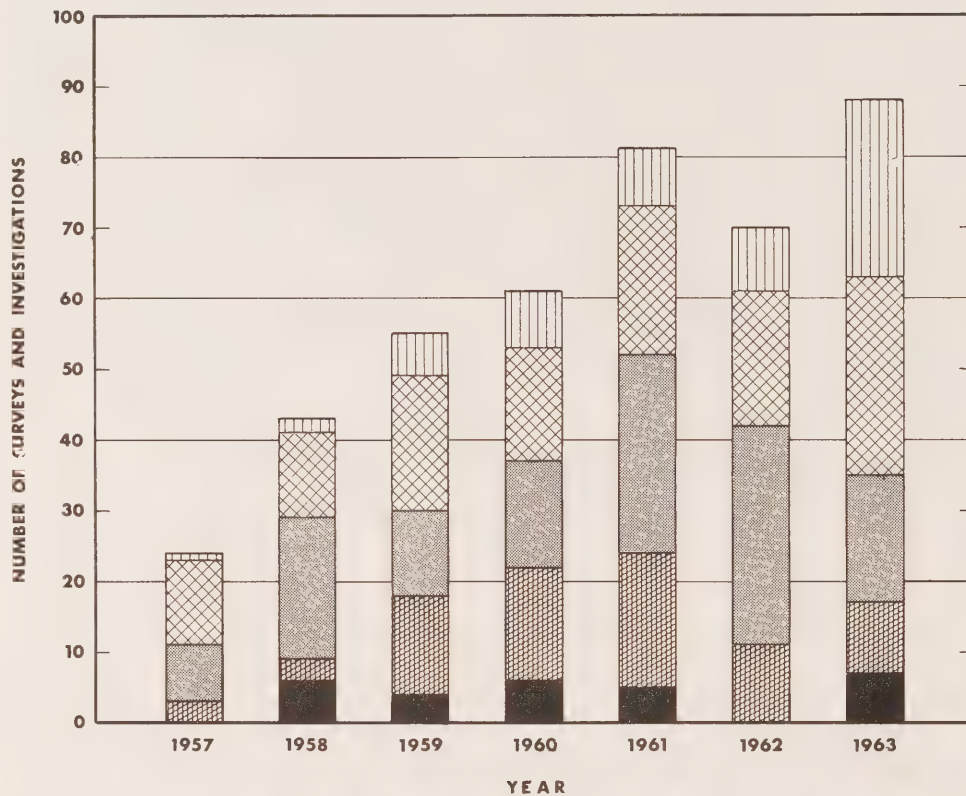
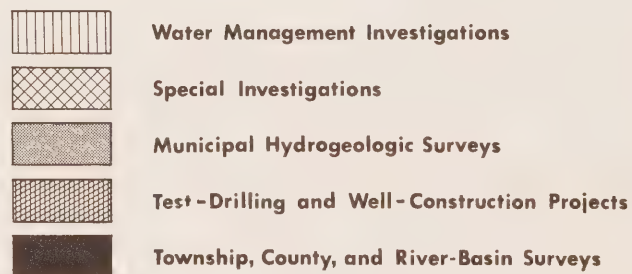


Figure 1 - Types of surveys and Investigations



The testing failed to locate satisfactory water supplies at Chapleau and Bobcaygeon. Drilling started at Vankleek Hill during December, and the three other projects were in various stages of the tendering procedure.

Special Investigations

There were 28 special investigations related to water supply and waste disposal problems. Many of the problems required only short investigations, but a few needed extensive studies of field and office data.

Seven investigations were carried out involving a search for better water supplies for individuals, communities, and institutions in the townships of Brighton, Douro, East Gwillimbury, East Zorra, Nairn, Plympton, Sarnia, and Tiny.

Investigations of specific water supply problems were made for seven municipalities. Well maintenance and rehabilitation studies were carried out in co-operation with other divisions of the Commission at Markham Township and Port Perry. Special studies involving water supply, test drilling, or extraction methods were made for the Township of Bucke; the towns of Burlington, Stayner, and Strathroy, and the City of Brantford.

Twelve investigations were made of waste disposal problems in the townships of Chinguacousy, East Gwillimbury, Georgina (2), Markham, North Dumfries, North Gwillimbury, North York, Puslinch, and Scarborough; the Village of Beaverton; and the Town of Burlington.

The possible effect on local water supplies of a salt and sand stockpile in Vaughan Township was studied, and an investigation was made of well contamination in Nepean Township.

Township and County Surveys

The ground-water sections were completed for the water resources survey reports of the counties of Carleton, Norfolk, and Peel, and the District of Sudbury. A draft of the water resources survey report for East Zorra Township was prepared. Field work and office studies were started to evaluate the water resources in parts of the townships of Etobicoke, North York, and Vaughan as part of a co-operative mapping project that is being carried out in the Woodbridge area with other government agencies.

River Basin Surveys

Planning and field work for a water resources survey of the Big Creek River Basin were initiated.

Hydrologic Data Program

The collection and assembly of basic hydrologic data in the branch was maintained through the submission of water-well records by drilling and boring contractors, the preparation of bulletins dealing with ground-water conditions in the province, and an observation well program. The hydrologic data program has been in operation since 1946 and has resulted in the accumulation of valuable information relating to geologic and ground-water conditions throughout the province. The data are organized in the offices of the branch for reference purposes; however, to make them more readily available to all persons interested in the field of water resources, they are assembled and prepared for publication in bulletin form. Ground-Water Bulletin 2 presenting the available hydrologic data for the years 1955 and 1956 was published and distributed during the year. The assembly for publication of hydrologic data for 1957 was completed and that for 1958 was started by the end of the year.

One geologist, one geologist's assistant, and one clerk were employed in carrying out this program.

Observation Wells

Water levels in 56 wells were being measured at the end of December, 1963. Automatic recorders were used in 20 wells; steel tapes in 31 wells; and airline devices in five wells. A graphic representation of the total number of observation wells and those equipped with automatic recorders from 1951 to 1963 is given in Figure 2. Twenty-three of the wells have been contributing water-level data for over five years.

Observation well data were required in certain areas because of special water problems. In Lobo and Delaware townships, water levels were being measured in eight wells to study the effect of pumping in the London-Komoka well field on water levels in the area. The taking of measurements was continued in six wells in the vicinity of the White Oak well field in Westminster Township.

Four wells at the proposed George Pittock damsite, north of the City of Woodstock in East Zorra Township, were kept under observation during the year. In addition, measurements were commenced in three privately-owned wells farther away from the proposed damsite to provide additional information on the effect of the dam and reservoir on ground-water levels.

An automatic recorder was installed on a well in Downie Township near the site of the proposed Wildwood Dam to observe the effects of construction and changing surface-water levels on ground-water levels in the area. Another automatic water-level recorder was installed on a gauge hole in the Markham township well field in an attempt to determine the trend of water levels in the well field during the year. Water-level recorders were installed on a short-term basis for measuring water levels during pumping

tests at the Village of Port Perry and the Township of Cumberland.

Well-Contractor Licensing Program

Four hundred and three licenses were issued in 1963 for carrying on the business of boring or drilling for water. Fifteen of the licenses were held by boring contractors and the remainder by drilling contractors. Records for 9,325 wells were forwarded to the Branch by the drilling and boring contractors during the year. The numbers of records received annually between 1951 and 1963 are shown in Figure 3. The three inspectors visited the contractors on 1,208 occasions and made 7,746 checks on the locations of wells and 302 checks for sanitary well construction. In addition to the three inspectors, one clerk was actively engaged in the water-well licensing program. The branch exhibited a display at the annual meeting of the Canadian Water Well Contractors Association at Vineland.

Charges were laid against two drilling contractors for violations of the regulation requiring the installation of new casing in water wells. A conviction was obtained in one case following an appeal by the Commission. The second case had not been heard by the end of the year.

Other Activities

Members of the branch presented three papers on ground water and water resources to outside groups and provided advice at three exhibits.

Discussions based on investigations carried out in previous years were held with representatives of the Police Village of Granton and the villages of Ailsa Craig and Jarvis.

The branch participated in a meeting between representatives of the Commission and the Ontario Department of Highways to discuss pollution caused by salt and sand stockpiles, and meetings with representatives of various departments of the provincial and federal governments to discuss water resources.

Maps were prepared showing general ground-water conditions in the southern part of the province.

SURFACE WATER BRANCH

The activities of the Surface Water Branch were carried forward mainly under three programs, water resources management, water resources surveys, and hydrologic data. Most of the efforts of the branch were directed to the permit processing activities of resource management program. The branch participated in the preparation of four county survey reports on water resources and initiated planning of one river basin survey. The program of obtaining hydrologic data was carried forward through the establishment of 10 streamflow gauging stations and by the direct measurement of streamflows.

Water Resources Management Program

The activities of the Surface Water Branch in all phases of the water permit program increased in 1963. Additional assistance was given to applicants; more applications and permits were processed; more interference complaints were investigated; and requirements related to associated office duties and inspection and enforcement increased.

A total of 2,682 applications for permits to take water from surface sources were dealt with during the year. Of these, 967 were carried forward from 1,962 and 1,715 were received during the current year. Twenty applications were withdrawn or were found to be for takings not subject to authorization by permit. One taking was approved by letter of approval and 2,632 takings were approved by regular permit. There were 34 applications under consideration at the end of the year. In addition, 17 applications were reviewed for the taking of water from both ground and surface water sources for which six permits were issued. Nine of the applications were withdrawn or determined to be unnecessary and two remained under consideration at the end of the year.

Most of the applications were concerned with the irrigation of tobacco crops. This reflected the attention given by the branch to the flue-cured tobacco-growing industry in 1962 and 1963. During the first five months of 1963 about 2,800 farms were visited in the sandy soil areas of the counties of Norfolk, Elgin, Simcoe, Oxford and Middlesex to advise irrigators of permit requirements and to assist with the completion of application forms. About 1,100 applications were received as a direct result of this field work. As a final step, news releases and notices of deadline dates for submission of applications from specific areas were effectively used to publicize the legislation requiring a permit for the taking of water.

Towards the end of the year attention was directed to other groups of irrigators such as those operating golf courses and growing fruit crops. The assistance of several associations and boards was received in the dissemination of information to their members.

Close liaison continued with the Surveys Section, Lands and Surveys Branch, Department of Lands and Forests, in the exchange of information of common concern. The co-operative handling of a number of water management matters with officers of conservation authorities was of mutual benefit.

In addition to a number of complaints concerning interference with surface sources of water supply which were dealt with by correspondence without field studies, 44 complaints were received which required field investigations. Many of these were complex and involved a number of persons. Most of the complaints were directed against irrigation practices. In general, co-operation was obtained in adjusting operations to relieve interference. In a number of instances dependence was being placed on supplies of water not dependable under drought conditions. The number of complaints was not as

great as might have been expected during a year in which near drought conditions were experienced. It was found that along many streams users had scheduled their takings so that needs could be met without causing interference. Some persistent problems remained where the ultimate solution depended upon the development of such auxiliary supplies of water as storage reservoirs.



With regard to inspection and enforcement, the regular staff was supported by four water-permit inspectors who were hired on a temporary basis. Field checks were made to see that withdrawals were authorized by permit, that the terms of permits were being observed, and that authorized takings provided for a fair sharing of water where competition existed for a limited supply.

Water Resources Surveys Program

The branch participated in two types of water resources surveys in 1963, a revised county survey program and river basin studies. The latter was planned for the fiscal year and initiated late in 1963.

The revised program of county water resources surveys which placed emphasis on municipal water supply and stream sanitation, had as its immediate objective the completion of four reports for which some field and office studies had been previously undertaken. This branch contributed sections on surface water resources for the reports for

the counties of Carleton, Peel and Norfolk and the District of Sudbury.

In the river basin survey program, certain delays were necessary in order to take advantage of federal financial support through the Agricultural Rehabilitation and Development Act (ARDA). In the current year planning for a survey in the Big Creek Drainage Basin was finalized and some activities of other programs were adjusted to provide basic data for this survey.

Hydrologic Data Program

To obtain streamflow discharge data the branch sponsored the installation of 10 streamflow gauging stations in co-operation with the federal government and made numerous streamflow observations on many of the small streams throughout southern Ontario. Pertinent hydrologic data which is available from a variety of sources were assembled and a number of meetings were attended for the purpose of discussing the collection and assembly of hydrologic data.

By sponsoring the installation and maintenance of 10 streamflow gauging stations, participation in the necessary improvement of the network of streamflow gauging stations in Ontario was initiated in 1963. These stations were installed and were to be maintained through a co-operative arrangement with the Water Resources Branch, Department of Northern Affairs and National Resources. The table below shows the locations of the 10 stations and the type of gauge installed at each station.

Streamflow Gauging Stations Installed in 1963

<u>Drainage Basin</u>	<u>Stream</u>	<u>Location</u>	<u>Type of Gauge</u>
Big Creek	Venison Creek	near Walsingham	Recorder
Big Creek	Big Creek	below Kelvin	Recorder
Dedrich Creek	Dedrich Creek	above Port Rowan	Recorder
Lynn River	Patterson Creek	above Simcoe	Recorder
Young Creek	Young Creek	below Vittoria	Recorder
Big Otter Creek	Little Otter Creek	below Straffordville	Recorder
Nottawasaga River	Bailey Creek	below Beaton	Recorder
Nottawasaga River	Mad River	below Glencairn	Manual
Bronte Creek	Bronte Creek	above Zimmerman	Recorder
Duffin Creek	West Branch	at Green River	Manual

The program of observation and manual metering of streamflows was continued in 1963. The program was inaugurated in the summer of 1962 in order to obtain as quickly as possible some data on flows for many of the smaller streams in southern Ontario for which no factual data were available. Two teams of summer students were employed in this program and with some help from regular staff made 2,858 observations and readings at 1,554 individual stations. Included in these figures are 301 observations made during a special

survey under drought conditions during the last week of October.

During the summer the main effort was concentrated in areas where competition for the available supply of surface water was expected to lead to interference problems. Of the 2,833 observations, 1,951 were actual flow measurements and 882 were no flow observations. The table below shows the increase in the manual metering program from 1962 to 1963.

Streamflow Metering Program

Year	No. of Stations	No. of Observations		
		Total	Measurements	No Flow
1962	553	669	440	229
1963	1,554	2,858	1,976	882

The list below shows the distribution of observations according to drainage basin for those basins in which 10 or more observations were made in 1963. The number of observations is shown in brackets.

Distribution of Streamflow Observations by Drainage Basin

Big Creek	323	Humber River	131
Big Otter Creek	320	Kettle Creek	94
Bowmanville Creek	30	Lynde Creek	23
Bronte Creek	30	Lynn River	252
Catfish Creek	81	Nanticoke Creek	152
Clear Creek	24	Oshawa Creek	19
Credit River	21	Oakville Creek	80
Dedrich Creek	143	Redhill Creek	16
Don River	147	Rouge River	42
Duffin Creek	52	Silver Creek	24
Etobicoke Creek	54	South Otter Creek	69
Forty Mile Creek	10	Spencer Creek	42
Ganaraska River	34	Stoney Creek	12
Graham Creek	12	Sydenham River	60
Grand River	202	Thames River	29
Grindstone Creek	15	Twenty Mile Creek	29
Harmony Creek	22	Wilmot Creek	18
Hay Creek	17	Young Creek	35
Holland River	25	Other drainage basins	169

The records obtained from the special survey carried out in October document to a limited extent streamflow conditions during a drought period in the areas from the County of Essex to the County of Northumberland. Results confirmed that in areas of heavy soils and rapid run-off, surface water supplies were seriously or completely depleted. In areas of light soils streamflows were not much below normal.

Other Activities

Members of the branch attended a number of conferences, conventions and seminars and participated in a number of activities not specific to a program.

A special study of water resources in the Stayner area was made at the request of the Stayner Public Utilities Commission, to assist in its planning for the development of future water supplies.



OWRC-MUNICIPAL PROJECTS

Here is a complete list of OWRC-municipal projects as at December 31, 1963:

- * - in partial operation td - test drilling
- ** - in operation
- ▲ - CMHC-OWRC project
- (S2) (W2) indicates a second sewage or water project for the municipality
- o- Pending test-drilling result A-actual cost (others estimated)

SEWAGE WORKS

Projects covered by (P)reliminary, (F)inal or (TD) test drilling agreement

Project Number	Municipality	Cost Estimate	Project Number	Municipality	Cost Estimate
57-S-1	A Toronto Twp.	502,440(F)**	59-S-34	Paris ▲	825,000(F)**
2	A Stratford	925,309(F)**	35	Nepean Twp.	1,477,573(F)**
3	A Bancroft	114,633(F)**	36 A	Point Edward	779,774(F)**
4	A Trenton	515,665(F)**	37 A	Hespeler	17,429(F)**
5	A Streetsville	310,938(F)**	38 A	Traflagar Twp.	
6	A Richmond Hill	359,420(F)**		(Now Oakville)	253,357(F)**
7	A Korah Twp.	44,309(F)**	39	Fort Erie ▲	646,000(F)**
58-S-8	A Coniston	468,190(F)**	40 A	Markham Vill.	608,711(F)**
9	A Frankford	162,062(F)**	41	Sudbury(McKim)	605,779(F)**
10	North Bay Area	2,372,976(F)**	42 A	Korah Twp.(S2)	113,537(F)**
11	A Brantford	2,250,956(F)**	43	Toronto Twp./	
12	Tillsonburg	609,793(F)**		Metro ▲	1,876,941(F)**
13 A	Port Arthur	2,157,836(F)**	44	Tarentorus	134,258(F)**
14	Brampton/Ching.	1,360,000(F)**	45	Kenora	88,100(P)
15	Huntsville	474,310(F)**	46 A	Preston ▲	147,618(F)**
16	Orangeville	180,453(F)**	47 A	Port Colborne	625,008(F)**
17 A	Georgetown	871,677(F)**	48 A	Leamington (S2)	55,780(F)**
18 A	Stirling & Ext.	258,992(F)**	60-S-49 A	Winchester	93,527(F)**
19 A	Kitchener (S1)	1,312,746(F)**	50	Ft. William	
	Kitchener(S2)▲	1,681,410(F)		& Ext. ▲	1,560,000(F)**
20	S.S. Marie Area	3,296,726(F)**	51 A	Burlington (S2)	676,034(F)**
21 A	Warton	130,601(F)**	52	Galt (S2)	167,076(F)**
22 A	Waterloo	728,676(F)**	53	Sudbury (S2) ▲	1,800,000(F)**
23 A	Fergus	277,393(F)**	54	Bracebridge ▲	421,274(F)**
24	Marmora ▲	30,460(F)**	55	Markham Vill.	262,262(F)**
25	Listowel	522,237(F)**		(S2)	
26	Leamington	95,510(F)**	56	New Hamburg ▲	390,000(F)**
27 A	London Twp.	923,643(F)**	57	Cornwall ▲	175,000(P)
28 A	Burlington	382,773(F)**	58 A	Chelmsford &	283,793(F)**
59-S-29	Mitchell(San) ▲	302,933(F)**		Ext.	
30 A	Galt	246,909(F)**	59	Fort Frances ▲	2,194,181(F)
31 A	Barrie	297,263(F)**	60	Seaforth	200,901(F)
32 A	Stratford (S2)	84,431(F)**	61 A	Grimsby	111,889(F)**
33 A	Westminster	270,727(F)**	62	Bradford ▲	282,125(F)**

S E W A G E W O R K S

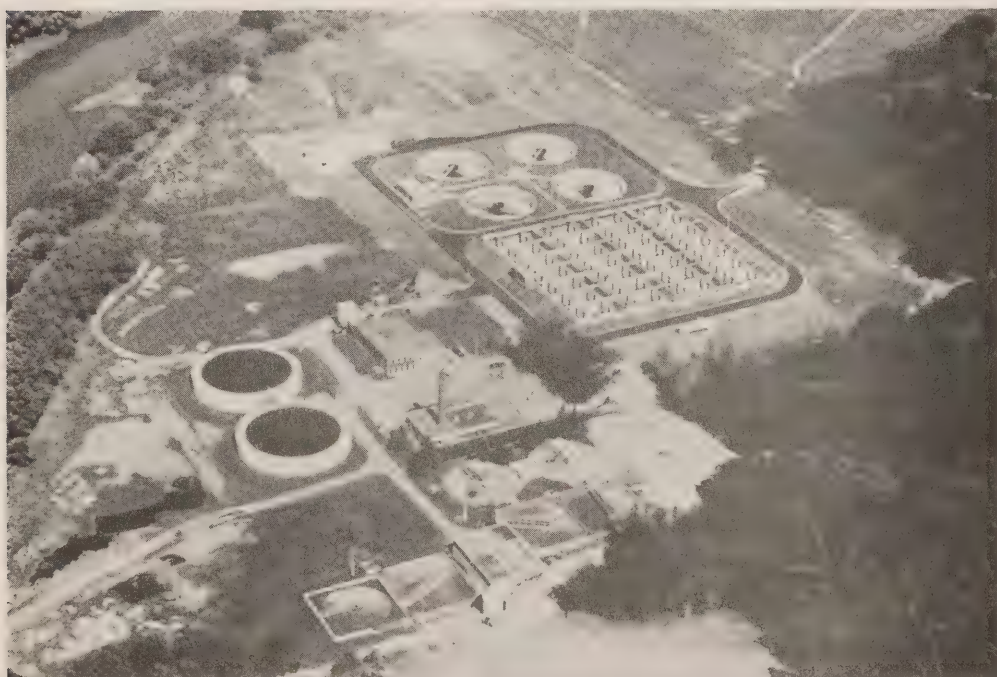
Projects covered by (P)reliminary, (F)inal or (TD) test drilling agreement

Project Number	Municipality	Cost Estimate	Project Number	Municipality	Cost Estimate
60-S-63	Playfair Twp. (Ramore) ★	60,251(F)**	62-S-100	Pt.Colborne(S4)	50,000(P)
64 A	Coniston (S2)	24,949(F)**	101A	Pt.Arthur (S2)	401,723(F)**
65	Neelon & Garson ★	722,000(F)**	102	Chatham	3,146,343(F)
66 A	Brampton (S2)	119,950(F)**	103	Widdifield(S2)	232,035(F)**
67	Listowel (S2)	62,699(F)**	104	Norwich Vill.	4,000(P)
68	Owen Sound(Storm)	742,580(F)**	105	Burlington(S3)★	2,100,000(F)
69	Owen Sound (Sanitary) ★	1,622,830(F)**	106	Michipicoten Twp. (Wawa) ★	366,550(F)
70	Korah Twp.(S3)	205,500(F)**	107	Niagara ★	328,908(F)
71	Timmins ★	820,719(F)**	108	Pt.Colborne(S3)★	191,000(F)
72	Shelburne & Ext.★	209,000(F)**	109	Chesley ★	268,280(F)
73	Pt.Colborne(S2)★	155,975(F)**	110	Kincardine ★	507,152(F)
61-S-74	Espanola ★	615,301(F)**	111	Sudbury (S3) ★	462,760(F)
75	Preston (S2)	87,629(F)**	112	Mattawa ★	268,015(F)
76	Nepean Twp.(S2)	162,541(F)**	113	Parry Sound	860,000(P)
77	Georgetown (S2)★	155,975(F)**	114	Arthur Vill.★	179,916(F)
78 A	Toronto Twp.(S3)★	571,626(F)**	115	Port Dover ★	730,174(F)
79	Fauquier Twp. (Moonbeam)	69,735(P)	116	New Liskeard	344,532(F)
80	Grimsby S.Twp. (Smithville) ★	246,000(F)	117	Korah Twp.	261,000(F)**
81	Vankleek Hill ★	205,000(P)	118	Elmvale ★	180,000(F)
82 A	Toronto Twp.(S4)★	282,096(F)**	119	Waterford ★	307,000(F)
83 A	Grimsby (S2)	28,369(F)**	120A	Simcoe ★	420,291(F)
84	Belleville ★	2,224,978(F)**	121	Sidney Twp. (Battawa)	171,399(F)
85 A	Tavistock (S1)	47,988(F)**	122	Sutton ★	321,431(F)
	Tavistock (S2)	293,050(F)	123	Harriston w	189,945(P)
	Tavistock (S3)	76,000(F)	124	Lindsay	400,670(F)
86	Newmarket ★	288,795(F)**	125	Elora ★	380,254(F)
87	Newmarket/East Gwillimbury ★	1,030,108(F)**	126	St.Catharines	535,800(F)**
88	Moore Twp. (Corunna) ★	830,170(F)		St.Catharines Ext.	17,400(F)
89	Port Credit ★	227,600(F)**	127	Gananoque ★	620,000(F)
90	Galt (S3) ★	1,370,000(F)	128	Saltfleet (S1)*	276,000(F)
91	Ft.William(S2)★	1,465,000(F)		Saltfleet (S2)*	272,200(F)
92	Pickering Twp.★	585,500(F)**	129	Wingham (Storm)	18,980(F)
93	Exeter ★	344,000(F)	130	Almonte ★	239,000(F)
	Exeter Ext.★	17,694(F)	131	Englehart	4,260(F)
94	Aylmer ★	467,000(F)**	132	Alexandria	193,690(F)
95	Trenton (S2)	202,000(F)**	133	Burlington (S4)★	758,793(F)
96	Elmira ★	621,000(F)	134	Tarentorus ★	224,699(F)
97	Markham Twp.(San) (Stage 1)	67,501(F)**	135	Burlington (S5)★	71,375(F)
97B	Markham Twp.(San) (Stage 2)	460,470(F)	136	Listowel	48,000(F)
98	Kingston Twp. ★	1,656,700(F)**	137	Powassan ★	76,792(F)
99	Cumberland Twp.	58,000(F)**	63-S-138	TorontoTwp.(S6)★	239,595(F)
	Cumberland Twp. Ext.	45,220(F)	139	Wingham (San)★	322,667(F)
			140	Frankford	80,819(F)
			141	Bradford ★	25,400(P)
			142	Essex (Town)	171,318(P)
			143	Essex (Industry)	83,812(P)
			144	Chelmsford	53,545(F)
			145	Toronto Twp. (S6)★	266,000(F)

SEWAGE WORKS

Projects covered by (P)reliminary, (F)inal or (TD) test drilling agreement

Project Number	Municipality	Cost Estimate	Project Number	Municipality	Cost Estimate
62-S-146	Midland ▲	920,000(P)	63-S-155	Ernestown	100,000(P)
147	Thorold	189,625(F)	156	Port Arthur	735,016(P)
148	Durham	255,000(P)	157	Little Current	216,500(P)
149	Brighton ▲	160,827(P)	158	Saltfleet Ext.	251,072(P)
150	Richmond Hill	28,500(P)	159	Burlington ▲	
151	Midland ▲	133,300(P)		Phase 2	725,000(P)
152	Englehart ▲	77,625(P)	160	Metro Toronto/ Toronto Twp.	40,000(F)
153	Rockland	359,000(P)	161	Chelmsford	21,200(P)
154	Emo Twp.	118,000(P)			
TOTAL NUMBER OF SEWAGE PROJECTS		161	TOTAL COST ESTIMATE SEWAGE		\$82,950,816



W A T E R W O R K S

Projects covered by (P)reliminary, (F)inal or (TD) test drilling agreement

Project Number	Municipality	Cost Estimate	Project Number	Municipality	Cost Estimate
57-W-1	A Markham Twp. \$	498,685(F)**	59-W-47	A Bertie Twp.	763,735(F)**
2	Frankford	119,402(F)**	48	McGregor Area	8,000(TD)
3	A Bancroft	240,290(F)**	49	A Midland	47,646(F)**
4	Harrow	500,439(F)**	50	Port Burwell	10,000(TD)
5	A Havelock	177,282(F)**	51	Kenora	99,070(P)
6	A Port Perry	62,421(F)**	52	Hastings & Ext.	201,839(F)**
7	A Dresden	170,829(F)**	53	A Whitby Twp.	
8	A Brock Twp.			(Brooklin)	170,381(F)**
	(Sunderland)	98,558(F)**	54	A Clarke Twp. (Orono)	7,256(TD)
9	A Winchester	265,324(F)**	60-W-55	Waterdown	10,000(TD)
10	Not Used		56	Haileybury (Abandoned)	
11	A Richmond Hill	218,457(F)**	57	A Fenelon Falls	303,660(F)**
12	A Essex County		58	West Ferris	68,859(F)**
	(Union System)	3,841,800(F)**	59	A Brampton	264,079(F)**
13	A Essex Town		60	A Wellington	246,526(F)**
	(Standpipe)	86,383(F)**	61	A King Twp.	389,111(F)**
58-W-14	Alfred	139,350(F)**	62	Campbellford	135,000(P)
15	Dundas	341,525(F)**	63	A Galt	200,005(F)**
16	Markham Vill.	46,745(F)**	64	A S.S. Marie	76,575(F)**
17	Dunnville Area 2	585,688(F)**	65	A Blind River	29,708(F)**
18	Kitchener	288,513(F)**	66	Vankleek Hill	164,500(P)
19	A Huntsville	102,305(F)**	67	Playfair Twp.	
20	A Orangeville	70,817(F)**		(Ramore)	47,259(F)**
21	A Bolton	60,742(F)**	68	A Ratter & Dunnet	
22	A Preston	268,656(F)**		(Warren Area)	80,716(F)**
23	Leamington (W2)	23,299(F)**	69	Goderich	997,000(F)**
24	A Stayner	59,056(F)**	70	A Beaverton	9,176(F)**
25	Marmora & 2 Exts.	238,097(F)**	71	A S.S. Marie (W2)	114,542(F)**
26	A Ancaster	189,556(F)**	61-W-72	Espanola	558,000(F)**
27	A Bracebridge Area	77,455(F)**	73	A Hanover	45,810(F)**
28	Cookstown	142,000(F)**	74	Acton	177,000(F)**
29	A Meaford	483,129(F)**	75	A Gosfield S. (W2)	95,945(F)**
59-W-30	A Belle River	55,354(F)**	76	Brantford Twp.	245,000(F)**
31	Maidstone	217,239(F)**	77	Brampton & Ext.	546,700(F)**
32	A Traflagar Twp.		78	Fauquier Twp.	
	(Now Oakville)	215,992(F)**		(Moonbeam)	93,845(P)
33	A Hespeler	12,546(F)**	79	A Dresden (W2)	109,574(F)**
34	A Elmvale	58,171(F)**	80	Geraldton	57,850(F)**
35	A Thedford	175,707(F)**	81	Anson Hindon	
36	A Tara	8,437(F)**		& Minden	146,160(F)
37	A Cannington	4,487(TD)	82	Pelham Twp.	20,000(TD)
38	Newcastle	156,043(F)**	83	Beaverton (W2)	83,000(F)**
39	Grand Bend	12,000(TD)	84	Gloucester Twp.	
40	A Bath Village	29,825(F)**		(Orleans)	10,000(TD)
41	Val Albert	227,075(P)	85	McDougall Twp.	8,000(TD)
42	A Mitchell	164,505(F)**	86A	S.S. Marie (W3)	1,097,000(F)**
43	A Dresden (W2)	17,088(F)**	86B	S.S. Marie (W4)	210,000(F)**
44	A Caledon East	99,910(F)**	87	Bradford	158,000(F)**
45	A Parkhill	158,375(F)**	88	Widdifield	232,000(F)
46	A Chesterville	293,610(F)**	89	Rockland	116,000(F)**

W A T E R W O R K S

Projects covered by (P)reliminary, (F)inal or (TD) test drilling agreement

Project Number	Municipality	Cost Estimate	Project Number	Municipality	Cost Estimate
61-W-90	Petawawa	188,500(F)**	62-W-106	Englehart	4,435(F)
91	TorontoTwp.	147,000(F)**	63-W-107	Louth Twp.	192,797(F)
92	Waterford/Wyoming/ Plympton	506,084(F)**	108	Harrow	102,573(F)
93	Eganville	5,000(TD)	109	Frankford	21,712(F)
94	Cumberland Twp.	186,969(F)	110	Bobcaygeon	7,000(TD)
95	Cumberland Twp. Ext.	248,549(F)	111	Belle River	159,223(F)
95	Brunetville	-0-	112	Neelon & Garson	102,915(F)
96	Point Edward	309,800(P)	113	Chalk River	128,335(P)
97	Toronto Twp. (W2)	422,500(F)**	114	Essex County	-0-
98	Bertie Twp. (W2)	61,600(F)**	115	Geraldton	141,756(F)
	Bertie Twp. Ext.	5,500(F)	116	Woodslee Area	189,710(P)
99	Brantford Twp. (W2)	121,312(F)**	117	Chapleau	12,000(TD)
100	Deseronto	12,000(TD)	118	Whitchurch	110,000(P)
101	Mersea (W2)	25,433(F)**	119	S.S. Marie	675,000(P)
62-W-102	Richmond Hill (W2)	75,934(F)	120	Newcastle	21,286(F)
	Richmond Hill (Stage 3)	18,906	121	Cache Bay	134,910(P)
103	Saltfleet	366,000(F)**	122	Emo Twp.	132,000(P)
104	Markham Twp.	287,517(F)	123	Havelock	7,000(TD)
105	Michipicoten	108,280(F)	124	Southampton (Not executed)	
			125	Thorah Twp.	89,670(P)
			126	Midland	15,000(TD)

TOTAL NUMBER OF WATER PROJECTS	- 122	TOTAL COST ESTIMATE WATER	\$27,101,900
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S U M M A R Y			
TOTAL SEWAGE PROJECTS	161	TOTAL COST ESTIMATE SEWAGE	\$ 82,950,816
TOTAL WATER PROJECTS	122	TOTAL COST ESTIMATE WATER	27,101,900
	283		<u>\$110,052,716</u>

NUMBER OF MUNICIPALITIES PARTICIPATING 186

